PB83-182758

Evaluation of Rural Air Quality Simulation Models

TRC Environmental Consultants, Inc.
East Hartford, CT

Prepared for

Environmental Protection Agency
Research Triangle Park, NC

Oct 82

U.S. Department of Commerce
National Technical Information Service
NTIS

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-450/4-83-003		PB83 182758

4. TITLE AND SUBTITLE	5. REPORT DATE
Evaluation of Rural Air Quality Simulation Models	October 1982
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
Richard Londergan, David Minott, David Wackter, Thomas Kincaid and David Bonitata	
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO.
TRC Environmental Consultants, Inc. 800 Connecticut Boulevard East Hartford, CT 06108	11. CONTRACT/GRANT NO. 68-02-3514
12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED
U.S. EPA OAQPS, MDAD, SRAB (MD-14) Research Triangle Park, NC 27711	14. SPONSORING AGENCY CODE EPA-450/4-83-003

15. SUPPLEMENTARY NOTES

16. ABSTRACT

This report summarizes the results of a comprehensive evaluation of "rural" point source air quality simulation models using routinely collected data around the Clifty Creek power plant. The report contains numerous tabulations of each model's performance in terms of statistical measures of performance recommended by the American Meteorological Society.

The purpose of the report is two-fold. First, it serves to document for the models considered, and similar models, their relative performance. Second, it provides the basis for a peer scientific review of the models. To stay within the spirit of this latter purpose, the report is limited to a factual presentation of information and performance statistics. No attempt is made to interpret the statistics or to provide direction to the reader, lest reviewers might be biased.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Mathematical modeling Meteorology Power Plants Sulfur Dioxide Statistical Measures Performance Evaluation	Air Quality Impact Assessment New Source Review	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release to public	Unclassified	300
	20. SECURITY CLASS *(This page)*	22. PRICE
	Unclassified	

EPA Form 2220-1 (9-73)

PB83-182758

United States
Environmental Protection
Agency

Office of Air Quality
Planning and Standards
Research Triangle Park NC 27711

EPA-450/4-83-003
October 1982

Air

EPA

Evaluation of Rural Air Quality Simulation Models

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

EPA-450/4-83-003

Evaluation of Rural Air Quality Simulation Models

by

Richard Londergan, David Minott,
David Wackter, Thomas Kincaid and David Bonitata

TRC Environmental Consultants, Inc.
800 Connecticut Boulevard
East Hartford, CT 06108

Contract No. 68-02-3514

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Monitoring and Data Analysis Division
Research Triangle Park, NC 27711

October 1982

PREFACE

This report summarizes performance statistics for a number of "rural" point source models. In the preparation of these performance statistics, every effort was made to follow the "letter and intent" of recommendations resulting from the AMS Workshop on Dispersion Model Performance held in 1980.

The purpose of the report is two-fold. First, it serves to document for the models considered, and similar models, their relative performance. Second, it provides the basis for a peer scientific review of the models. To stay within the spirit of this latter purpose, the report is limited to a factual presentation of information and performance statistics. No attempt is made to interpret the statistics or to provide direction to the reader, lest reviewers might be biased.

This is the first attempt to prepare such a comprehensive performance evaluation using the AMS recommendations. Future evaluations of other model categories are planned.

CONTENTS

Preface ii
Figures iv
Tables v

1. Introduction 1
2. Air Quality Data Base 3
3. Statistics Approach 7
   Data Sets For Comparison of Observed and Predicted Concentrations 7
   Peak Concentrations 9
   Comparisons of All Concentrations 11
   Statistical Analysis of Model Performance 12
4. Description of Analysis System and Models 17
   Description of Clifty Creek Data Archive 19
   Description of Models and Model Runs 20
   Description of Statistical Evaluation Procedures 30
5. Model Performance Results 32
6. Conclusions and Recommendations 62

References 65

APPENDICES

A Statistics for 25 Highest Values
B Statistics for All Events
C Statistics for Highest Concentration at Each Station
D Comparisons of Highest Values for Various Pairings
E Selected Model Evaluation Input Data
F Statistics for Revised MPSDM Runs

FIGURES

Number		Page
1	Field Monitoring Network Near the Clifty Creek Power Plant . . .	5
2	Flow of Data Through the System for Evaluation Air Quality Models	18
3	Cumulative Frequency Distributions of Observed and MPTER-Predicted Concentrations	38

TABLES

Number		Page
1	Summary of Data Sets for Rural Model Evaluation with Clifty Creek Data Base	8
2	Statistical Estimators and Basis for Confidence Limits on Performance Measures	13
3	Principal Technical Features of the CRSTER/MPTER Model and Technical Differences Between It and Other Models As Run for This Study	22
4	Difference of Observed and Predicted Averages of the 25 Highest SO_2 Concentration Values (Unpaired in Time or Location)	40
5	Difference of Observed and Predicted Averages of the 25 Highest SO_2 Concentration Values (Unpaired in Time or Location)	45
6	Average Difference Between Observed and Predicted Concentration Values Event-By-Event (Paired in Time)	50
7	Average Difference Between Observed and Predicted Concentration Values Event-By-Event (Paired in Time)	53
8	Comparison of Maximum Observed and Maximum Predicted Concentration Values	56
9	Comparison of Maximum Observed and Maximum Predicted Concentration Values	59

SECTION 1

INTRODUCTION

In March 1980 EPA published a notice in the Federal Register which provided an opportunity for organizations to submit dispersion models for possible inclusion in the next revision of EPA's "Guideline on Air Quality Models." A large number of models were submitted in response to this notice. To decide in an objective manner which models in the "rural" category should be included in the guideline and what recommendations should be made concerning the use of these dispersion models for regulatory applications, EPA has undertaken a systematic evaluation. TRC, working under contract to EPA, has assembled an air quality data base, set up and run the dispersion models, and produced statistical comparisons of observed and predicted air quality. These comparisons have been summarized in tabular form.

In September 1980 the American Meteorological Society (AMS) organized a workshop (sponsored by EPA) to consider the issue of model performance evaluation. The 1980 workshop held at Woods Hole, Massachusetts, produced a report entitled "Judging Air Quality Model Performance".[1] This report contains recommended statistical procedures for comparing observed air quality with model predictions. The procedures recommended by the Woods Hole workshop provided the basis for the statistical comparisons presented in this report.

The air quality data base to which model predictions were compared was acquired with a six-station network of continuous SO_2 monitors in the vi-

cinity of the Clifty Creek power plant in southern Indiana. Measurements spanning 2 years, 1975 and 1976, were used in this study. Specific features of the data base are described in Section 2.

In Section 3 the statistical approach is described. The set of observed and predicted concentration values has been sorted in a variety of ways to provide statistical model performance comparisons that reflect either high concentration values or all concentration values, with and without pairing according to time and space. These data sets are defined, and the specific statistical tests applied to each are outlined.

The analysis system used by TRC to implement the statistical comparisons is described in Section 4. This section discusses the data archive, the dispersion models, and the methodology of the statistical analysis. Particular attention is devoted to describing the technical differences among the models (as run for this study), how model options were selected, and what modifications were required to obtain model predictions appropriate for this evaluation.

The results of the study are described in Section 5. The tables of statistical comparisons for all models evaluated and for all of the performance measures recommended by the AMS workshop are presented in a series of Appendices (A-D). Summary tables of selected results are presented and discussed in Section 5. Appendix E provides tables of hour-by-hour model input and observed SO_2 air quality for each of 10 selected days when high SO_2 concentrations were measured; these data provide a basis for case study analyses of selected high-impact episodes.

Finally, in Section 6, conclusions and recommendations from the work assignment are presented. These conclusions and recommendations are concerned primarily with the procedures used in the study and possible improvements for future studies.

SECTION 2

AIR QUALITY DATA BASE

Under an earlier work assignment, TRC reviewed available data bases suitable for evaluating model performance. For the rural model category, two data bases were recommended. The first was the set of air quality, meteorological, and emissions data assembled by Teknekron[2] under EPA contract in 1979 for several Ohio Valley power plants owned by the American Electric Power Corporation (AEP). The second data set was the Hanford 67 Series tracer dispersion experiments performed at the Hanford reservation of the Atomic Energy Commission in central Washington State.[3]

At the outset of this project, TRC acquired the AEP data set, contacting both EPA and Teknekron staff members familiar with the data. More specific information regarding data quality, plant operating history, the terrain surrounding different plants, and the availability of complete data sets was assembled. The data for the Clifty Creek plant for the years 1975 and 1976 were selected as the most suitable part of the AEP data set for evaluating rural models.

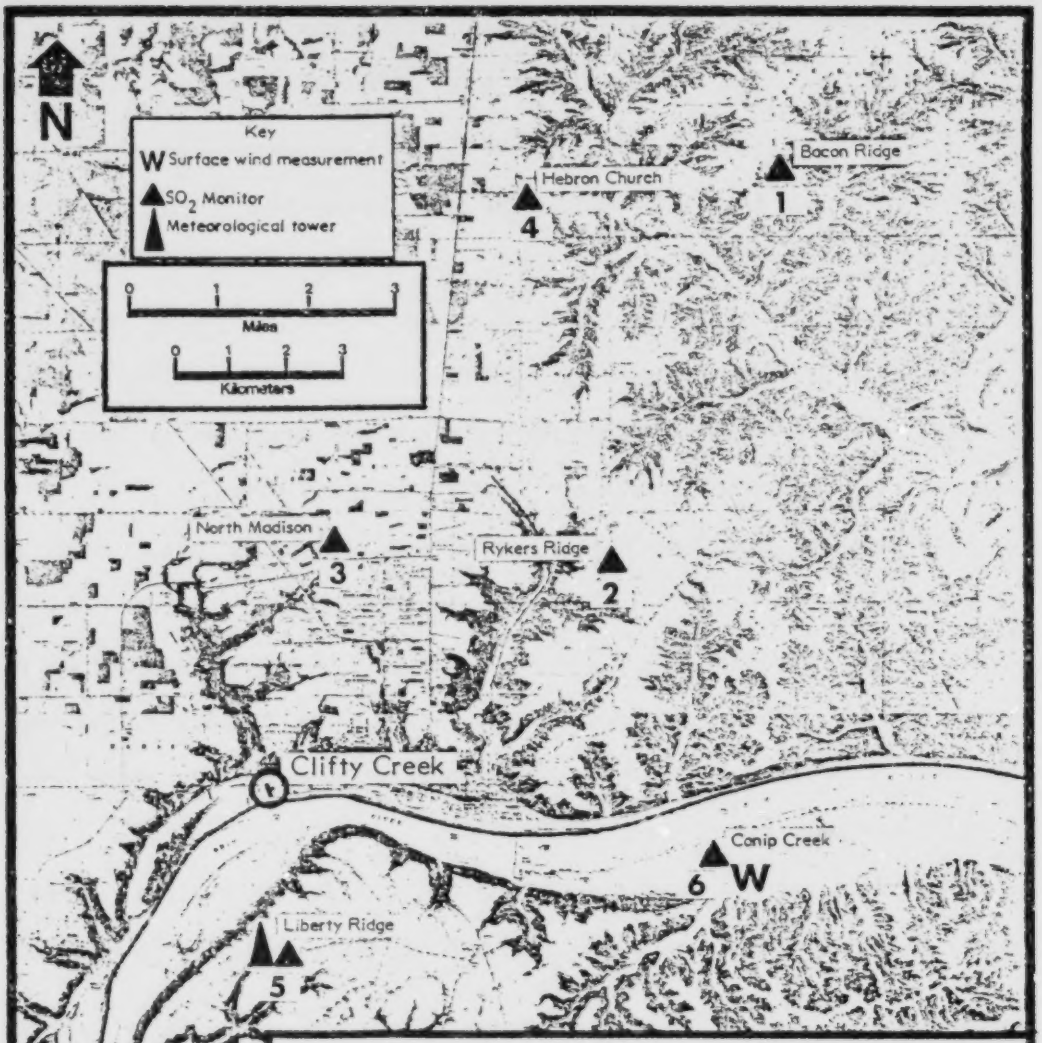
TRC also assembled the Hanford 67 Series data set in preparation for this study. Subsequently, however, model evaluation with this data set was deferred because of resource and schedule constraints and because of the limitations of that data base for testing many of the features that distinguish the different models being evaluated.

Two years of data (1975 and 1976) from the Clifty Creek power plant data base have been used to generate two respective sets of model performance

statistics. The Clifty Creek plant, operated by the Indiana-Kentucky Electric Corporation, is a coal-fired, base-load facility located along the Ohio River in southern Indiana. Three 208-meter stacks were used throughout the study period to vent plant emissions. Terrain surrounding the plant consists of low ridges and rolling hills; however, hill and ridge top elevations do not exceed stack height. The data base which TRC used was assembled by Teknekron from air quality and meteorological data measured by Environmental Research and Technology (ERT), standard National Weather Service (NWS) data and plant operating data supplied by AEP.

Hourly air quality data were acquired from a six-station network of continuous SO_2 monitors (Meloy) located in southern Indiana and northern Kentucky and ranging from about 3 to 15 kilometers from the Clifty Creek plant. Figure 1 illustrates the locations of the monitoring stations relative to the power plant, and also indicates monitor elevations. Hourly meteorological data, compiled by Teknekron in the standard format from the Meteorological Preprocessor Program (CRSTER preprocessor),[4] were supplied to TRC for input to the models. Surface data include hourly values of wind speed, wind direction and ambient temperature measured in the Clifty Creek network. The wind speed, measured at the 60-meter level of the Liberty Ridge meteorological tower (located approximately 3 kilometers south of the Clifty Creek plant) had been previously reduced (by Teknekron) to the 7-meter level by use of the CRSTER rural wind profile. The effective 7-meter data were input to the models, which subsequently used their respective, internal wind-profile algorithms to extrapolate the 7-meter wind speeds to a stack-height value.* The randomized wind direction values

*The effect of this procedure on the performance of one of the models has been further studied and the findings are summarized in Appendix F.



Monitors	Plant Distance (km)	Elevation MSL(m)	Azimuth From North of Plant(°)
1. Bacon Ridge	15.0	277	40
2. Rykers Ridge	7.4	274	56
3. North Madison	4.5	267	16
4. Hebron Church	11.6	273	24
5. Liberty Ridge	3.1	253	174
6. Canip Creek	8.0	146	99
Clifty Creek Plant Elevation		143	
Elevation at Top of Stacks		351	

Figure 1. Field monitoring network near the Clifty Creek Power Plant.

calculated by the preprocessor were replaced by wind direction data measured to the nearest degree on-site at the 60 meter level.

Temperature was measured at the 10-meter level at Liberty Ridge. Pasquill-Gifford (P-G) stability classes were calculated by the preprocessor on the basis of insolation and wind speed using the Turner method. Input for calculating stability were hourly wind speed and cloud cover data from the Cincinnati NWS station. Hourly values of mixing height were determined by the preprocessor, using the CRSTER interpolation scheme, based on the morning radiosonde and surface temperature measurements at the Dayton NWS station, the hour of the day, and hourly stability class.

Source data for the Clifty Creek plant include hourly SO_2 emission rate, gas exit velocity and gas exit temperature. Values for the SO_2 emission rate were estimated for each hour by Teknekron based upon the percent load for each boiler (hourly) and the average monthly sulfur content of the coal. Values of the hourly megawatt generation for each power plant boiler were provided to Teknekron by AEP.

This data set was acquired by TRC and archived in a format to facilitate model performance evaluation. The use of the data base in this study is described in Section 4.

SECTION 3

STATISTICS APPROACH

The 1980 AMS Woods Hole workshop on model performance evaluation[1] recommended a comprehensive list of performance measures and statistics for evaluating air quality models. In addition, the workshop recommended comparisons of the full set of observed-predicted data pairs, of the highest observed and predicted concentration per event and of the highest N values (unpaired in time or space), plus comparisons for subsets representing individual monitoring stations or selected meteorological conditions.

TRC and EPA reviewed the workshop report and formulated a statistical approach based on workshop recommendations. An outline of the specific data sets, performance measures, and statistics for this study was reviewed with Dr. Douglas Fox, workshop chairman, prior to performing the statistical comparisons. The approach is described below, with particular attention to items that represent departures from workshop recommendations or that were not addressed by the workshop.

DATA SETS FOR COMPARISON OF OBSERVED AND PREDICTED CONCENTRATIONS

The data sets listed in Table 1 represent the different types of comparisons recommended by the AMS workshop. In each instance, comparisons were recommended for the basic 1-hour unit for model predictions and also for 3- and 24-hour averaging times. To compare observed and predicted air quality values on a common basis, it is necessary to account for background concentration, i.e., contributions to measured air quality from sources

TABLE 1. Summary of Data Sets for Rural Model Evaluation with Clifty Creek Data Base*

A. Peak Concentration Comparisons	(A-1) Compare highest observed value for each event with highest prediction for same event (paired in time, not location)	B. All-Concentrations Comparisons	(B-1) Compare observed and predicted values at a given station, paired in time (a total of six data sets).
	(A-2) Compare highest observed value for the year at each monitoring station with the highest prediction for the year at the same station (paired in location, not time)		(B-2) Compare observed and predicted values for a given time period, paired in space (not appropriate for data sets with few monitoring sites).
	(A-3a) Compare maximum observed value for the year with highest predicted values representing different time or space pairing (fully unpaired; paired in location; paired in time; paired in space and time)		(B-3) Compare observed and predicted values at all stations, paired in time and location (one data set).
	(A-3b) Compare maximum predicted value for the year with highest observed values for various pairings, as in (A-3a)		(B-4) Same as (B-3), but for subsets of events by meteorological conditions (stability and wind speed).
	(A-4a) Compare highest N (=25) observed and highest N predicted values, regardless of time or location		
	(A-4b) Compare highest N (=25) observed and highest N predicted values, regardless of time, for a given monitoring location. (A total of six data sets.)		
	(A-5) Same as (A-4a), but for subsets of events by meteorological conditions (stability and wind speed).		

* Nomenclature is taken from a letter of October 20, 1981 from William M. Cox (EPA) to Richard Londergan (TRC) summarizing the presentation format for the performance statistics.

whose impact is not modeled. For this study, the estimated background was subtracted from measured concentrations before comparing them with model predictions. (See p.27 for more detail.) In Table 1, and in the discussions that follow, "observed value" denotes a measured concentration minus background.

PEAK CONCENTRATIONS

For peak concentrations, comparisons are made to determine model performance both on an unpaired basis and for various pairings in time and space. The first two items in Table 1 represent a comparison of the highest observed and highest predicted concentrations, paired in time (A-1) and paired in location (A-2). For the Clifty Creek data set, these two comparisons provide quite different measures of performance since the number of events is large (1 year represents 365 days or 8,760 hours) while there are only six stations.

For many hours during a year, none of the six monitoring stations experiences significant observed or predicted impact from the Clifty Creek plant. These hours of effectively zero observed and zero predicted impact are relatively uninteresting for the evaluation of air quality models for regulatory purposes. Including those hours in statistical analyses adds greatly to the computational burden and tends to dilute the model performance results from hours with significant impact. Consequently, threshold values were imposed to screen the data base for statistical analyses. If, for a given time period, both the observed concentration (adjusted for background) and the predicted concentration at a station were below the threshold, that data pair was excluded from further analysis. A threshold value of 25 $\mu g/m^3$ was used for 1- and 3-hour averages, and a value of 5 $\mu g/m^3$ was used for 24-hour averages.

Item A-3a represents a comparison of the highest observed concentration values, regardless of time or space, and predicted values representing different time and space pairing. The AMS workshop recommended such comparisons for the "N" highest values. TRC and EPA elected to present only single-value comparisons to illustrate the results, because of the difficulty of interpreting statistics for larger data sets. Item A-3b is directly analogous to A-3a, but starts from the highest predicted value.

Items A-4 and A-5 involve comparisons of the "N" highest observed and predicted values, unpaired in time or space. The AMS workshop recommended that such comparisons be based on the upper 2 to 5 percent of concentrations, rather than on one or two extreme values. For rural point source situations, significant impact (measurably different from zero) at a given monitor location may be observed or predicted for as few as 5 percent of the hours during a year. In this instance, 2 to 5 percent of all values would represent approximately 50 to 100% of the non-zero concentrations. As an alternative to the percentile approach, TRC recommended using a small number (N=25) which would more appropriately represent the set of highest observed and predicted values, while still providing a statistical basis for establishing confidence limits. On a percentage basis, 25 values represent roughly 7 percent of the 365 24-hour values in a year, about 1 percent of the 3-hour values, and about 0.3 percent of the 1-hour values.

Air quality data often exhibit spatial and temporal correlation, particularly over time periods of a few hours. For 1- and 3-hour periods, the highest 25 values were screened to eliminate cases with two or more high values from the same period, or with two consecutive high values at the same location. This screening is intended to reduce the effect of autocorrelation and to avoid double-counting a single event. For 24-hour

averaging periods, less auto correlation is expected, and this screening was not included.

Comparisons of the highest 25 observed and predicted values were performed for all stations combined (A-4a), for each station individually (A-4b) and for subsets of events corresponding to selected meteorological conditions (A-5). For 1- and 3-hour periods, data subsets were established by dividing the total data set into groups according to the model input wind speed or atmospheric stability class for each period. Three wind speed groups were defined: low wind speed (less than 2.5 m/sec); moderate (2.5 to 5 m/sec); and high (greater than 5). Four atmospheric stability groups were defined: unstable (class A or B); slightly unstable (class C); neutral (class D); and stable (class E, F, or G). For 3-hour periods, the median of the three hourly wind speed or stability class values was used to categorize each period. Subsets were not defined for 24-hour periods since the same dispersion conditions generally do not persist on that time scale.

COMPARISONS OF ALL CONCENTRATIONS

In addition to peak concentration analyses, the AMS workshop recommended that comparisons be made based upon all observed and predicted concentration values. Table 1 lists three items of this type. Item B-1 is the comparison of observed and predicted values at a given monitoring station (for all data pairs above the threshold values). Item B-3 represents comparisons based on the set of values from all six stations combined. Item B-4 represents subsets of B-3 to reflect specific meteorological conditions. The same wind speed and atmospheric stability criteria described for item A-5 above were used to define subsets for 1- and 3-hour averaging periods here.

STATISTICAL ANALYSIS OF MODEL PERFORMANCE

The AMS workshop report recommended two somewhat different lists of performance measures for comparing model predictions with observed air quality, one appropriate for data sets representing pairs of observed and predicted values, the other appropriate for unpaired data sets. Paired data sets provide a means for assessing how well a model predicts on an event-by-event basis, while unpaired sets do not. Table 2 summarizes the basic list of performance measures, and the statistical methods recommended for establishing confidence limits on each measure. At the head of each column (Paired and Unpaired) are listed the data sets from Table 1 to which each list of measures and statistical methods has been applied.

The data sets from item A-1 (highest observed and predicted values for each event) and from items B-1, B-3, and B-4 all represent observed and predicted values paired in time. For these sets, statistical analyses based on the residuals (i.e., the differences between each pair of observed and predicted values) are appropriate for measuring model performance. If the time pairing for these data sets is ignored, however, it is also possible to assess model performance (in aggregate) by comparing the features of the composite set of all observed values to those of the predicted values. Consequently, both paired and unpaired comparisons were recommended by the workshop for these data sets. Data sets representing comparisons of the highest 25 values, regardless of time or space, provide no basis for paired analysis. For these sets (A-4, A-5), only unpaired comparisons were performed. Item A-2, comparison of the single highest observed and predicted values from each of the six stations, represents a very small data set for which any statistical analysis is of marginal value. Only the paired comparison performance measures were computed for this case. No statistics were computed for the single-value comparisons in item A-3.

TABLE 2. Statistical Estimators and Basis for Confidence Limits on Performance Measures

Performance Measure	Estimator	Basis for Confidence Interval: Paired Comparison (Sets A-1, A-2, B-1, B-3, B-4)	Basis for Confidence Interval: Unpaired Comparison (Sets A-1, A-4, A-5, B-1, B-3, B-4)
Bias	Average	One sample "t," with adjustment for serial correlation	Two sample "t"
	Median	Wilcoxon matched pair	Mann-Whitney
Noise/Scatter	Variance	Chi-squared test on variance of residuals	F test on variance ratio
	Gross variability	None	Not applicable
	Average absolute residual	None	Not applicable
Correlation	Pearson correlation coefficient	Fisher "z"	Not applicable
Frequency distribution comparison	Maximum difference between two cumulative distribution functions	Kolmogorov-Smirnov (K-S) test on f(d) vs. a normal distribution	K-S test on f(obs.) vs. f(pred.)

For paired comparisons, as noted above, the performance measures are based on an analysis of residuals. Model bias is indicated by the average and/or the median residual, with a value of zero representing no bias. The characteristic magnitude of the residuals is an indicator of the scatter between observed and predicted values on an event-by-event basis. Three measures of noise or scatter were computed:

- Variance $\frac{1}{N-1} \sum_i (d_i - \bar{d})^2$
- Gross variability $\frac{1}{N} \sum_i d_i^2$
- Average absolute residual $\frac{1}{N} \sum_i |d_i|$

where d_i is the residual (observed minus predicted) for data pair i, $\bar{d}$ is the average residual, and N is the number of data pairs. The correlation of paired observed and predicted values is measured by the Pearson correlation coefficient. To interpret these performance measures, it is useful to know the properties of the frequency distribution of residual values. The final performance measure is therefore a comparison between the actual distribution of residuals and a normal distribution.

For unpaired comparisons, the list of performance measures is somewhat shorter. Model bias is indicated by the difference between the average (or median) observed value and the average (median) predicted value. A ratio of the variances of the observed and predicted values is provided to indicate whether the distribution of values in the two data sets is comparable. Similarly, the frequency distribution of observed values is compared with that for predicted values.

Standard statistical methods have been used to estimate confidence limits for each of the performance measures. Discussion of the statistical procedures may be found in most statistics textbooks. For parametric procedures, the reader is referred to Snedecor and Cochran (1967),[5] while for nonparametric procedures Hollander and Wolfe (1973)[6] provide an appropriate description.

For paired comparisons, the confidence interval on the average residual can be estimated using the one-sample t test. This parametric test incorporates the assumption that the residuals follow a normal distribution, but for large N, departures from normality are not critical when the number of events is large. Serial correlation can affect results significantly, however, since the number of "independent events" will be overestimated and the calculated variance may understate the magnitude of the actual random error component. The AMS workshop recommended the adjustment of confidence limits for serial correlation. A method described by Hirtzel and Quon (1981)[7] has been used to adjust the confidence interval from the one-sample t test. The interval given by the standard one-sample t test is multiplied by the factor $[(1+r)/(1-r)]^{1/2}$, where r is the lag-one autocorrelation coefficient of the residuals.

An analogous nonparametric indicator of model bias is the median residual. The statistical method for estimating a confidence interval on the median residual is provided by the Wilcoxon matched-pairs test. No straightforward method of adjusting the confidence intervals from the Wilcoxon test for serial correlation has been identified.

A confidence interval for the variance of the residuals is calculated using a chi-squared test. No adjustment was made for serial correlation. No standard method is available for estimating confidence intervals for the

gross variability or average absolute deviation measures. For the Pearson correlation coefficient, the Fisher z test provides a method of estimating the confidence interval.

Comparison of two cumulative distribution functions is accomplished using the Kolmogorov-Smirnov (K-S) test. For this test, the two distribution functions are compared across the full range of concentration (or residual) values, and the maximum frequency difference between the two functions is identified. For the paired comparisons, the residual frequency distribution is tested for normality.

For unpaired comparisons, two bias measures are computed. The average of the observed values is compared with the average of the predicted values. The confidence interval on the difference of the averages is estimated with a two-sample t test. The difference of the medians is also computed, and the confidence interval is estimated using the Mann-Whitney nonparametric test.

The variance of observed values is compared with the variance of predicted values for unpaired data sets. The performance measure is the ratio of the variances; the F test provides confidence limits on the ratio. The frequency distribution comparison for unpaired data sets provides a measure of the difference between the observed and predicted distribution functions. The K-S test is again used to assess the statistical significance of the maximum frequency difference.

SECTION 4

DESCRIPTION OF ANALYSIS SYSTEM AND MODELS

The system for evaluating air quality models, developed by TRC for EPA/OAQPS, consists of three basic modules as shown conceptually in Figure 2. These modules perform the functions of:

1) Data base archiving
2) Air quality model calculations
3) Statistical evaluation

Data obtained from Teknekron were processed and stored on archive files as part of the archive module. In the model module, these archive files are used by a model preprocessor to create model input files and a work file of measured air quality concentrations. Next, the model is run to obtain predicted concentrations, which are merged with the measured data to create the work file. The evaluation module also contains a preprocessor step in which observed concentrations (measured minus background) and predicted concentrations are screened and sorted into appropriate statistical program input files. The second step of the evaluation module is to employ the statistics package to produce objective statistics for analysis and model evaluation. A description of the steps involved in manipulating and passing data through the three modules of the model evaluation system is presented in this section. In addition, the technical features of each model are described, and the specific problems encountered in each phase of the analysis system are noted.

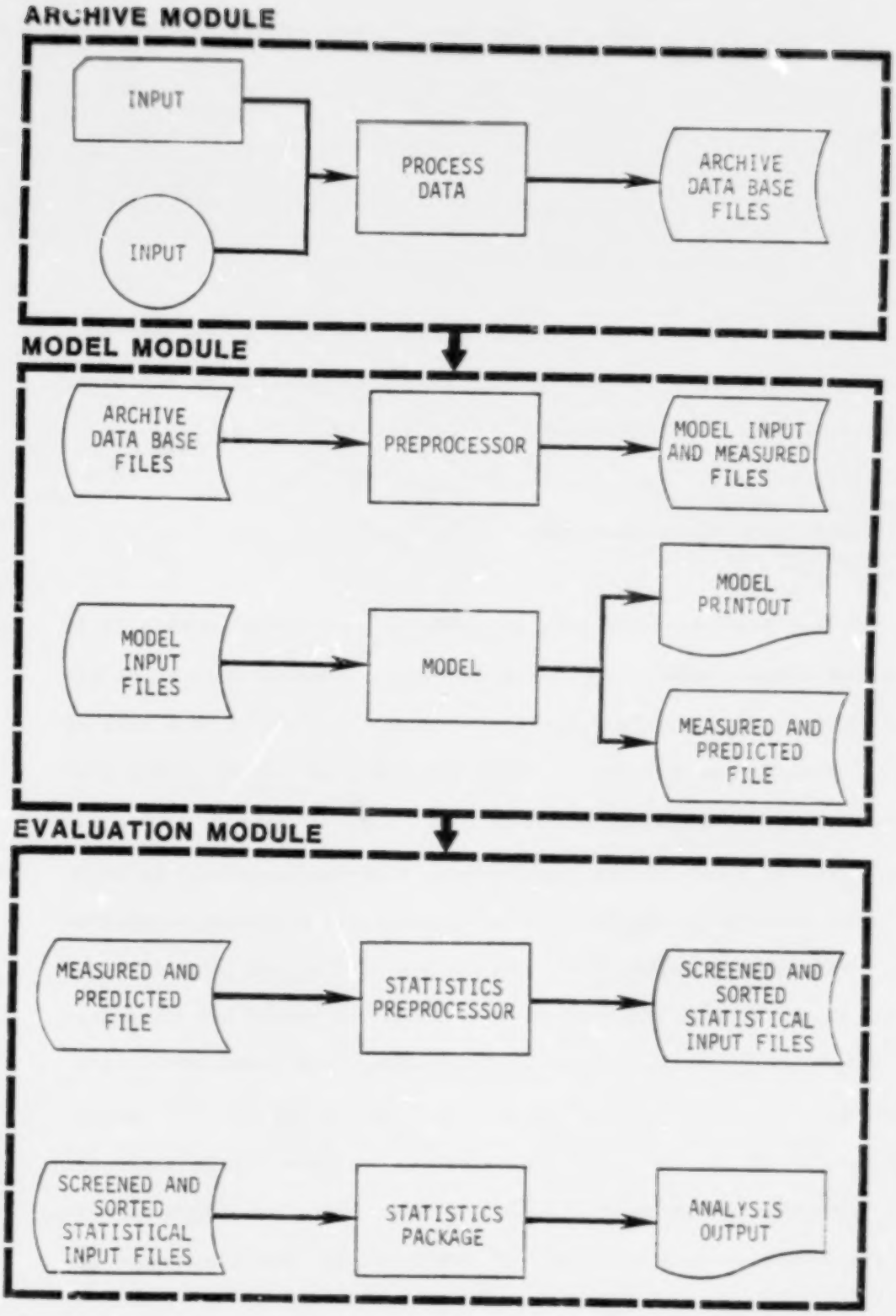


Figure 2. Flow of Data Through the System for Evaluating Air Quality Models

DESCRIPTION OF CLIFTY CREEK DATA ARCHIVE

The 2 years of data (1975 and 1976) from the Clifty Creek power plant data base were obtained on magnetic tape and installed on the archive files. These files are maintained on the EPA UNIVAC 1100 computer. The data base (described in Section 2) was assembled by Teknekron from air quality and meteorological data measured by ERT, and standard National Weather Service data and plant operating data supplied by AEP.

Hourly meteorological data, compiled by Teknekron in the standard format from the Meteorological Preprocessor Program (CRSTER preprocessor),[4] was supplied to TRC for input to the models. Since these data were in a standard model input format, they were simply transferred to disc files for later use by the evaluation module.

Source data for the Clifty Creek plant included the hourly SO_2 emission rate, gas exit velocity and gas exit temperature. Hourly values for the SO_2 emission rate and percent load for each boiler were included in the data set assembled by Teknekron. Stack gas exit velocities were calculated by TRC using a relationship developed by Teknekron. Above 50 percent load, the velocity is proportional to plant load. When the load factor was less than 0.5, the velocity calculated for 50 percent load was selected. The stack gas temperature (445.37K) was found by Teknekron[2] not to vary significantly with load. Therefore a constant value was used.

Hourly SO_2 concentrations measured at the six stations in the Clifty Creek network (Figure 1) complete the data set used for this model evaluation study.

The Clifty Creek data set described above was processed and written to three archive files. The header file contains information generally describing the data base, while the index file contains locations of each parameter and the data file contains the actual parameter values. A fourth

archive file, the generalized parameter identifier file, provides a fixed set of identification codes and descriptions for each data base parameter. The archive system is explained and documented in the report[8] "Description of Archive Structure to Accommodate Data Bases Appropriate for Model Evaluations," prepared for EPA by TRC in an earlier work assignment.

Data Base Errors

Two errors were discovered in the Clifty Creek data base. The first error was a spuriously high ambient temperature value which caused an abnormal termination in the plume rise algorithm of the MPTER model. This spurious temperature value was replaced by assuming persistence from the previous hour. The second error identified in the data base was also for a meteorological variable. A wind speed value of zero caused the MULTIMAX model to terminate abnormally. The wind speed value for that hour was set to the value measured in the previous hour. The Clifty Creek data base had been screened and used by Teknekron in a previous model evaluation study. Teknekron evidently did not encounter problems from these erroneous values.

DESCRIPTION OF MODELS AND MODEL RUNS

Ten rural models were considered for evaluation: MPTER, CRSTER, PLUME5, MPSDM, COMPTER, SCSTER, 3141, 4141, TEM-8A, and MULTIMAX. Technical evaluation by EPA resulted in the conclusion that MPTER, CRSTER, and PLUME5 (with the particular options selected) would predict equivalent concentration values when applied to the Clifty Creek plant. Therefore, evaluation statistics were prepared for eight models including MPTER. In this section, the basic technical features which distinguish the seven remaining models from MPTER are identified. Also described are the data preprocessors and

modifications to model computer codes required to obtain model predictions appropriate for comparison with observed concentrations.

Model user manuals provided by EPA were reviewed to obtain a through understanding of the technical features, input requirements, options available to the user and the flow of logic in the computer code. The model authors were contacted by telephone whenever model documentation required clarification, and to define the set of input options preferred by the author in each case for applying the model to the Clifty Creek data base. The models were run in the technical modes recommended by the model builders.

Model Features

CRSTER is the EPA reference model for rural, noncomplex sites; however, a modified EPA version of MPTER has been used here as a CRSTER-equivalent substitute.* The key technical features of the MPTER/CRSTER model as run for this study, plus the principal differences between this and the other models (as run), are summarized in Table 3.

Terrain Treatment--

The influence of elevated terrain on plume dispersion is generally simulated in the rural models by lowering the effective height of the elevated pollutant plume above ground in proportion to the height of the terrain

*The UNAMAP 4 version of MPTER was not used since it differs slightly from CRSTER in the treatment of inversion penetration. The CRSTER-equivalent version of MPTER used in this study checks for plume penetration of the mixing height after adjusting the plume height for terrain; while the UNAMAP 4 version of MPTER makes this check immediately above the source only. Also, MPTER allows arbitrary receptor locations to be specified exactly, unlike CRSTER which uses a polar receptor grid.

Table 3. Principal Technical Features of the MPTER/CRSTER Model and Technical Differences Between It and Other Models As Run for This Study**

o MPTER/CRSTER (EPA)

Full terrain subtraction
Briggs final plume rise
Uses stability classes A, B, C, D, E, F
Stability class restriction (G replaced with F)
Pasquill-Gifford σ_y and σ_z
Mixing height (L) used for all stability classes
Uniform mixing beyond where σ_z exceeds 1.6L
Full plume penetration. When H >L, then ground-level concentration (χ) = 0
Wind profile power-law coefficients of 0.1, 0.15, 0.20, 0.25, 0.30 and 0.30 for stability classes A-F.

o MPSDM (ERT)

ASME (1979) dispersion coefficients
Terrain treatment* (1/2 height, unstable and neutral; full terrain subtraction, stable)
Transitional plume rise
5 stability classes (F used for all stable)
Stack-tip downwash
Buoyancy enhanced dispersion (σ_y and σ_z)
Mixing height not used for stable conditions
Uniform mixing not assumed
Briggs Partial plume penetration
Wind profile power law coefficients (.09, .11, .12, .14, .20)

o COMPTER (Alabama Air Polution Control Commission)

Buoyancy enhanced dispersion (σ_z)

* While full terrain subtraction was intended for stable conditions, the model actually utilizes 1/2 terrain height treatment for all stability classes because of an internal error in the code.

** It should be noted that some of the models have other options that could have been exercised to either increase, decrease, or even eliminate differences with MPTER/CRSTER. For each model offering one or more options, the selection of the most appropriate option(s) for the model's evaluation was based on guidance from the user's manual and discussion with the model developer.

(continued)

Table 3. (Continued)

- SCSTER (Southern Company Services)

  Hoffnagle terrain treatment (terrain subtraction factor k = .2, .3, .4, .5, .6, .6 for stabilities 1-6)
  Mixing height used for stable conditions
  Test for penetration of mixing height made before terrain correction

- 3141 (Enviroplan)

  Terrain treatment (1/2 terrain height subtraction from plume centerline)
  Buoyancy enhanced dispersion (σ_y and σ_z)
  Horizontal dispersion for 60-minute averages ($\sigma_y = 1.82\ \sigma_{yP}$)
  Stability class restriction (G replaced with F)

- 4141 (Enviroplan)

  Same as 3141 except terrain treatment is 3/4 terrain height subtraction for stability class E, F, or G

- TEM-8A (Texas Air Control Board)

  Flat terrain assumed
  Horizontal dispersion for 60-minute averages ($\sigma_y = C_i\ \sigma_{yPG}$;
  where C = 3.35, 2.70, 2.14, 1.71, 1.37, 1.37 for stabilities 1-6)
  Transitional plume rise
  Mixing height not used for stable conditions
  Uniform mixing at 2 times the distance beyond where $\sigma_z = 0.47L$
  Full plume penetration when H >2L; then χ=0.

- MULTIMAX (Shell Oil)

  Transitional plume rise

feature. This effective plume height is then used in the dispersion calculation. Of the models evaluated, only TEM-8A does not adjust the plume height for terrain. The MPTER/CRSTER model uses full subtraction of the terrain elevation from the plume height. This "full terrain" treatment is also employed by COMPTER and MULTIMAX. For the remaining models, the effective height is calculated by subtracting some fraction of the full terrain height. The factors shown in Table 3 for SCSTER represent the fraction of terrain height subtracted from plume height for each stability class. Models 3141, 4141 and MPSDM use 1/2 terrain height subtraction for nonstable conditions. For stable conditions, 3141 continues to use 1/2 terrain height subtraction, 4141 uses 3/4 terrain subtraction, and MPSDM uses full terrain subtraction.

Plume Rise--

All of the models calculate an effective stack height for emissions based on the Briggs buoyant plume rise formulations. The transitional plume rise concept employed by MULTIMAX, TEM-8A and MPSDM uses the distance-dependent plume rise formulations. The other models use final plume rise for calculating effective stack height at all distances from the source.

Dispersion Coefficients--

The Pasquill-Gifford dispersion coefficients are used by each model except MPSDM. In MPSDM, the ASME dispersion coefficients are used in the Gaussian equation.

Since the Pasquill-Gifford and ASME dispersion coefficients are generally representative of short period releases, they may not account for the dispersive effect resulting from atmospheric motions on the time scale of

several minutes to 1 hour. The models 3141 and 4141 attempt to account for this effect by enhancing the horizontal dispersion coefficients by a factor (1.82) proposed by Gifford. The model TEM-8A enhances the horizontal dispersion coefficients as a function of stability with the factors provided in Table 3. None of the other models (as run) adjusts for this effect.

Several models account for enhanced dispersion resulting when ambient air is entrained in a buoyant plume. COMPTER, 3141, 4141 and MPSDM use similar formulations to enhance σ_z by an amount proportional to $(\Delta H)^2$. The same formulations are used to enhance σ_y as well in 3141, 4141 and MPSDM. COMPTER does not enhance σ_y. While MPTER/CRSTER allows the option of enhanced dispersion, it was not used in this evaluation.

Stability Classification--

The original Pasquill-Gifford dispersion curves only delineated six stability categories (A-F). However, a seventh stability category (G) is frequently used to characterize extremely stable atmospheric conditions. Three of the models evaluated here (COMPTER, TEM-8A, and MULTIMAX) use the P-G coefficients for stability categories A-F in the Gaussian equation while setting ground-level concentrations to zero for stability class G. Models MPTER, SCSTER, 3141 and 4141 use P-G coefficients for stability class F in the Gaussian equation whenever class G occurs. The ASME dispersion coefficients are used by MPSDM. The version of MPSDM employed for this study provides for five stability classes, including only one stable category. Hours classified as E, F or G stabilities are simulated with the ASME dispersion coefficients recommended for stability class F.

Mixing Height--

Most of the models, including MPTER, assume that the plume is fully reflected by a stable lid at the mixing height. However, when the effective plume height exceeds the mixing height, these models assume full plume penetration of the elevated stable layer, resulting in zero ground-level concentrations. TEM-8A and MPSDM use slightly different assumptions regarding the effects of stable lids on plume behavior. TEM-8A simply assumes that a plume is fully reflected by a stable layer aloft unless the effective plume height is at least double the mixing height. For plumes above twice the mixing height TEM-8A assumes zero ground level concentrations. MPSDM uses the partial plume penetration scheme developed by Briggs. In this scheme the fraction of a plume exceeding the mixing lid is calculated. The plume material within this fraction of the plume (with a limiting value of 0.5) is removed from the source term in the Gaussian equation.

Wind Profile--

All the models use a power law formulation to adjust wind speed from measurement height to stack height. The wind speed power law exponents used by MPTER/CRSTER are used by all of the other models except MPSDM. The exponents used by MPSDM are smaller than those for MPTER and result in a somewhat lower wind speed at the height of the Clifty Creek stacks.

Preprocessors

All the models required some modifications to link the archived input to the models, and to format model output for subsequent use by the statistics package. To keep model modifications to a minimum, the functional link

between archived input and each model is a model-specific preprocessor. Each preprocessor performs two basic functions:

1) Creates the input files expected by the model.
2) Creates an initialized, model-specific work file.

The input files expected by the model generally include data describing the model options selected for this application; characteristics of the sources, receptors and meteorology to be modeled; and actual data values used in the mathematical algorithms. The preprocessor also passes data from the archive into a model-specific work file for use during the statistical evaluation. The work file contains hourly values of the following variables: date, time, wind speed, wind direction, atmospheric stability, mixing height, background concentration, measured concentration and predicted concentration. The predicted concentration is written to the work file by the model, which has been modified for this purpose. The other variables, except background concentration, come directly from the data base archive files.

To compare model-predicted concentrations with monitored values, the background concentration must first be taken into account. In this analysis, the background SO_2 concentration has been subtracted from the monitored concentration on an hour-by-hour basis. Hourly background concentrations were estimated using the approach recommended by EPA in the Guideline on Air Quality Models.[9] In this method, a background concentration for each hour is calculated as the average of values at monitor locations outside the 90^{o} sector downwind from the local source (in this case, the Clifty Creek power plant). In cases when the background estimate exceeds the measured concentration at a station, the observed value is set to zero (never to a value less than zero).

Other Modifications

Each model, except MPSDM and COMPTER, required additional assumptions or modifications to produce the output necessary for the statistical model evaluations. These are noted below by model:

- MPTER

  Logic to input hourly values of stack exit velocity.

  Elimination of internal adjustment of exit velocity by the ratio of the hourly emission rate to the maximum emission rate.

- TEM-8A

  Logic to input hourly (rather than average) emission rate and stack exit velocities.

  Logic for discrete (arbitrary) receptor locations. Elimination of model-generated rectangular array of receptors.

  Logic for output of hourly predicted concentrations. (The model otherwise divides hourly values by 24 prior to calculating 24-hour averages.)

- 3141/4141

  Logic to input hourly emission rate and hourly stack exit velocity (rather than average values).

  These models incorporate a polar coordinate receptor grid with a 10-degree azimuthal spacing between receptors. The receptor closest (in direction) to each monitoring station was used to represent that station. (The radial distance of each ring of receptors from the source can be specified by the model user. The correct radial distance for each monitoring station was used.)

- SCSTER

  Logic to input hourly (rather than average) emission rate and stack exit velocity.

- MULTIMAX

  Logic to input hourly (rather than average) emission rate and stack exit velocities.

Reduction of source and receptor array sizes and, hence, reduction of computer core requirements.

"Dummy-up" of system software that does not work on EPA UNIVAC computer.

Model code is FORTRAN V, which requires FIELDDATA input and generates FIELDDATA output. It was therefore necessary to convert input files from ASCII to FIELDDATA, and output from FIELDDATA to ASCII.

Verification

Several measures were taken to verify that modifications made to the models were producing intended results. Before any changes were made to model computer codes, a cross-reference map was used to assure that previously defined variables and common-block arrays were not being overwritten by new variables. The cross-reference map was also used to trace each modified variable through the computer code, to ensure that a program change did not have any unintended consequences. Intermediate and final printed model results were scrutinized for illogical or spurious variable values. As a final step, data values written to the work file were compared with model printed output to ensure that the output modifications were functioning properly. Unfortunately, it was not practical to use before-and-after test runs to verify model performance.

Model Runs

The final step in generating predicted concentration values was to run the models and write the predicted concentrations to the appropriate records of the work file (previously initialized by model preprocessor). Two work files were created, one for each year of data.

In the course of the model evaluations some initially suspect results led to the discovery of incorrect model codes in MPSDM. In these cases, the problems and possible corrections were discussed with the model developer. Two modifications were subsequently made to the MPSDM model. One was in the units of expected input ambient temperature in the CONVRT (preprocessor) program. The second modification, also in CONVRT, was to read the wind direction data from the proper section of the CRSTER preprocessor output. Another problem identified in the MPSDM code was that user-supplied terrain adjustment factors were overwritten by a fixed value of 0.5. This last problem could not be addressed within the time frame of this model evaluation effort.

DESCRIPTION OF STATISTICAL EVALUATION PROCEDURES

The comparison of model predictions with observed air quality was accomplished in the series of steps that were graphically depicted in Figure 2. The statistical approach has been described in Section 3, and in this section, the implementation of the statistical analyses is described. The statistical evaluation module (see Figure 2) consists of two components: a preprocessor to sort the working file into data sets for statistical analysis; and a statistical package to compute values and confidence intervals for the performance measures.

The "work file" of observed and predicted hourly concentrations, plus associated hourly meteorological parameters, is sorted by the statistics preprocessor into a number of data sets. The preprocessor computes average values for 3- and 24-hour periods, screens each pair of measured and predicted concentrations according to threshold values, and then constructs the individual files required to perform each type of comparison listed in Table 1.

The statistical package then calculates the specific performance measures listed in Table 2. The statistical computations were performed on the EPA Univac 1110 computer, using the Statistical Package for the Social Sciences (SPSS).[10,11] TRC constructed two basic SPSS runstreams, one to implement the paired comparisons, the other for unpaired comparisons, and applied each as appropriate to the various data sets.

The SPSS routines impose numerous limitations upon the analysis system. It is virtually impossible to adapt the SPSS programs and output for a specific application, and many calculations therefore had to be performed external to the automated run-streams. The adjustment of t-test results for the effects of serial correlation, for example, was performed in a second computational step at TRC, as were all of the confidence interval calculations. The SPSS output from the Wilcoxon matched-pairs test could not be used in the form provided by SPSS, and this comparison has therefore been dropped from the result tables. (The Wilcoxon results are generally redundant with the t test, and were therefore judged to be dispensable in light of the considerable effort required to recompute them separately.) Similarly, for the unpaired comparisons, SPSS output for the Mann-Whitney test posed several difficulties. Mann-Whitney test results have been presented only for the 25 highest value data sets (A-4, A-5), since the calculations were performed external to SPSS and became extremely cumbersome when the number of events was large.

SECTION 5

MODEL PERFORMANCE RESULTS

The 1980 AMS Woods Hole workshop on model performance evaluation recommended a comprehensive set of performance measures and statistics for comparing model predictions with observed air quality. In the preceding sections of this report, the statistical approach and the analysis system have been described. The model performance results which have been obtained are organized into a series of appendix tables. This section explains the organization of those appendices and also presents a summary of selected results.

Comparisons between observed and predicted statistical measures were produced for each of the eight models, for three averaging times (1, 3, and 24 hours) and for each of two years of air quality data from the Clifty Creek monitoring network. The results are presented in a series of four appendices. Appendix A presents results based on comparison of the 25 highest observed and 25 highest predicted concentration values (A-4, A-5). Appendix B presents results for all data pairs (B-1, B-2, and B-4) and for the highest concentration per event (A-1). Appendix C presents the results for the highest observed and predicted concentration value at each station for the entire year (A-2). Appendix D presents results for maximum concentration values with various time and space pairing constraints (A-3). An explanation of the data sets, performance measures and statistics is found at the beginning of each appendix. Appendix E provides tables of hour-by-hour model input and observed SO_2 air quality for each of 10 selected days

when high SO_2 concentrations were measured. Case study analyses can be pursued by interested readers.

In the appendix tables, results for different models are generally presented in separate tables. To facilitate comparisons among the models, a series of summary tables has also been prepared. These tables contain statistics on model bias from each of the sets of appendix tables. The summary tables are presented at the end of this section.

Tables 4 and 5 correspond to the results presented in Appendix A. Tables 4 and 5 compare the average of the 25 highest observed concentration values with the average of the 25 highest values predicted by each model. The numbers in parentheses following the difference of the averages represent a 95 percent confidence interval. Results are given for all locations and all events, station-by-station, and for events grouped by meteorological conditions (wind speed and atmospheric stability class.) Each table consists of three parts, representing the three averaging times. Table 4 presents results for 1975; Table 5 presents results for 1976.

Tables 6 and 7 correspond to the results presented in Appendix B. The average difference between paired observed and predicted concentration values is listed for each model. Results are given for all locations and all events, for the highest concentration per event, for each monitoring station, and for events grouped by meteorological conditions. Tables 6 and 7 again contain three parts, with results for different averaging times.

Tables 8 and 9 correspond to results presented in Appendix C and Appendix D. Comparisons are based on the highest concentration values observed and predicted for an entire year. The highest single values are compared, regardless of location, and the averages of the highest values at all

stations are compared. Tables 8 and 9 consist of three parts for the different averaging times.

Model performance results for the 25 highest values are summarized in Tables 4 and 5. The results for 1975 for 1-hour averages are presented in Table 4(a). For all stations and all events combined, the difference between the average of the 25 highest observed and predicted values is negative, indicating overprediction, for six of the eight models. Results range from a difference of -424 $\mu g/m^3$, for MPSDM, to a difference of +234 $\mu g/m^3$ for 4141, compared with an average observed concentration of 791 $\mu g/m^3$. In parentheses following the difference of averages, the 95 percent confidence interval is indicated.

Results by station in Table 4(a) indicate considerable variation in prediction bias from station to station for most of the models. At station 6, all of the models give average predicted values lower than the average observed value. Results for different meteorological conditions show clear trends for all of the models. The difference of averages increases (shifts toward underprediction) as wind speed increases. Similarly, the difference of averages tends to increase as the stability group changes from unstable (class A and B) to stable (class E and F) conditions. For class A and B, all of the differences are negative (indicating overprediction); for class E and F, the difference is positive (indicating underprediction) for seven of the eight models.

Selected results for 1975 for 3-hour and 24-hour averages are summarized in Tables 4(b) and 4(c). The 3-hour average results over all stations and events indicate less overprediction than 1-hour results; six models overpredicted for the highest 25 1-hour values, but only three models overpredicted for the highest 25 3-hour values. This trend is continued for 24-hour

averages, with only one model (COMPTER) overpredicting. Station-by-station results are mixed, but also exhibit the same trend (toward model underprediction) as the averaging period increases. The variations in model performance for different meteorological conditions for the 25 highest 3-hour average values (Table 4b) show dependence on wind speed and stability similar to that noted for the 1-hour average results.

Table 5 (a, b, c) presents a summary of results obtained for the 25 highest values for the year 1976. Results are generally consistent with those noted above for 1975, although for specific models, stations, and meteorological conditions some distinct differences are also evident. A majority of the models again overpredicted the average of the 25 highest 1-hour values, and again underpredicted for the 3- and 24-hour values.

Tables 6 and 7 present selected results obtained for comparisons of observed and predicted values for all events, not just the highest 25 values. The average observed value, computed for all data pairs above the threshold value, is listed, along with the average difference between observed and predicted values for each model. A consistent tendency toward underprediction (positive average differences) is evident in the results for all three averaging periods. For 1- and 3-hour averages, these results indicate that any overprediction at high concentration values (see Tables 4 and 5) is offset by underprediction at lower concentrations. Trends in the results for different meteorological subsets are less pronounced for all concentration values than for the 25 highest, but overprediction is again indicated for class A and B stability, despite the overall pattern of underprediction. Relatively few differences are evident when results for different averaging periods or years are compared.

Comparisons based on maximum observed and predicted concentration values for an entire year are presented in Tables 8 and 9. The single highest predicted value over all stations, and the average of the maximum predicted values at each station, are compared with the corresponding observed values. The instability of single-value comparisons is evident when results for different averaging periods or years are compared. For 1975, the highest 1-hour observed value (Table 8a) was larger than the highest predicted value for six of the eight models. By contrast, for 1976 the highest value was overpredicted by six models. Results are somewhat more consistent for the average of the maximum values at the six monitoring stations, but variations are still evident. The overall tendency toward model underprediction for 24-hour averaging periods (noted above for the 25 highest values) is also evident in Tables 8c and 9c.

This discussion of selected results illustrates the format in which the summary tables of model performance statistics are presented and highlights some of the basic patterns and trends evident in the results. The complete set of performance statistics for the measures recommended by the AMS workshop is presented in Appendices A to D. A few particular comments are warranted, however, to point out overall patterns and trends for certain performance measures which are not included in the summary tables.

One measure of model performance recommended for comparing observed and predicted values on an unpaired basis is the comparison of cumulative frequency distributions. The tables in Appendix A and Appendix B present frequency distribution comparison results for the 25 highest values and for all concentration values, respectively. In Appendix A, with frequency distributions based on a small number of values (N = 25), the results indicate

that differences between the observed and predicted distributions are often not significant at a 95% confidence level. (Unless the observed and predicted frequency distributions differ by more than 0.385, the result is not significant at a 95 percent confidence level.)

In Appendix B, frequency distributions based on all concentration values, or on the highest values for all events, are compared. With the larger sample size, a much smaller difference between the frequency distributions is significant at 95% confidence. For 1-hour and 3-hour averaging periods, results indicate significant differences between the observed and predicted frequency distributions in virtually every instance. Figure 3 illustrates the observed and predicted cumulative frequency distributions for one selected case. In this figure, the distribution of hourly values predicted by MPTER is compared to the distribution of observed values for all Clifty Creek monitoring stations for 1975. While the two distribution functions appear comparable at higher concentration values (above 200 $\mu g/m^3$), they diverge at lower values. Since the number of events with low observed and predicted values is much greater than the number with high values, the frequency distribution comparison results are generally dominated by the low values. (It should be noted that Figure 3 illustrates frequency distributions constructed without any screening for threshold values. Results in Appendix B represent comparison after screening for threshold).

Results for the correlation coefficient measure are also worth noting. In Appendix B, the correlation coefficient serves as one indicator of model performance to compare the variation of observed and predicted values event by event. The correlation coefficients show a clear dependence on averaging period, as results for the highest values by event illustrate. For each

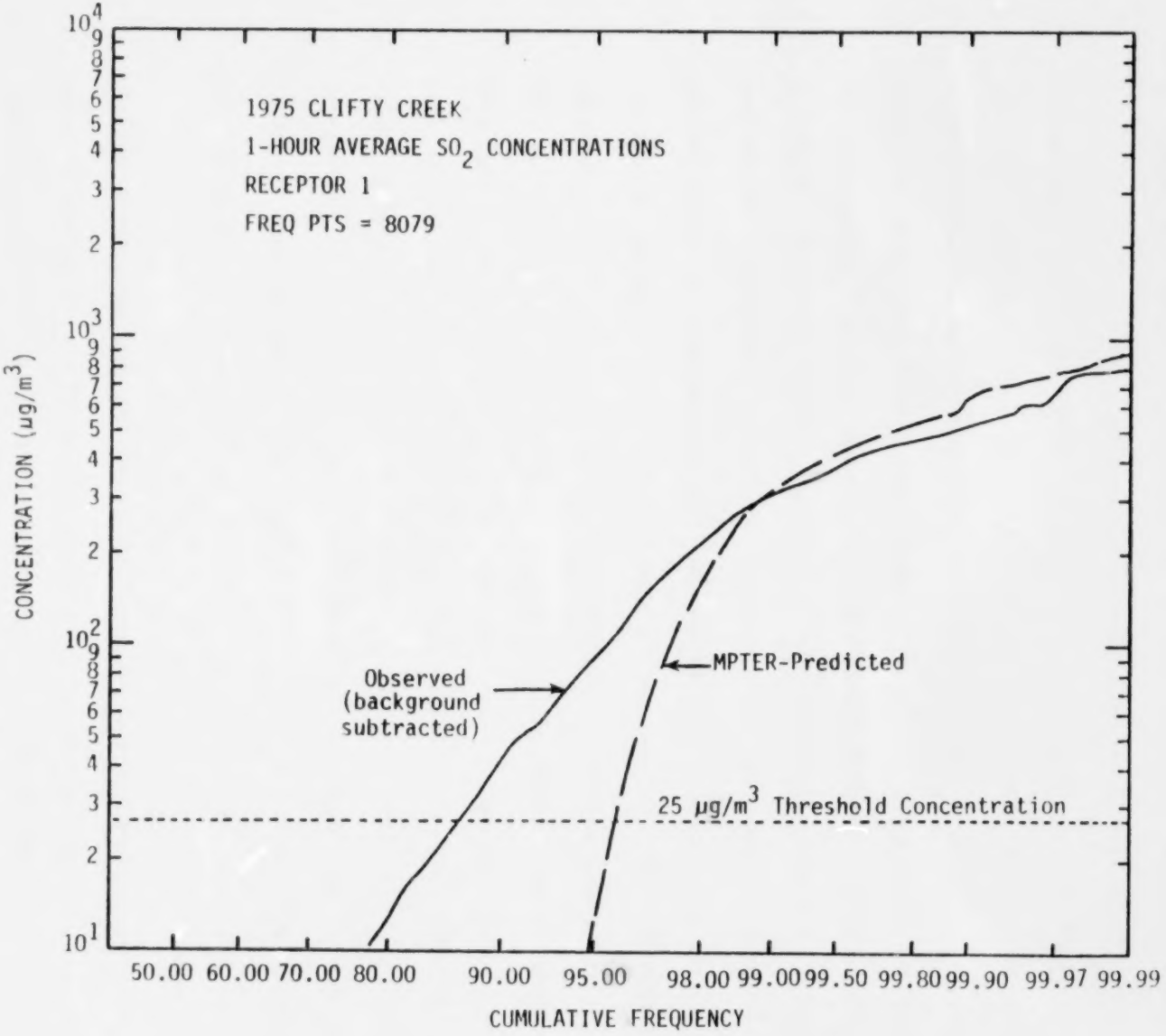


Figure 3. Cumulative frequency distributions of observed and MPTER-predicted concentrations.

model, the correlation coefficient increases as the averaging period increases. For 1-hour averages, values for different years and models range between 0.11 and 0.20; for 3-hour averages, values range between 0.16 and 0.30; while 24-hour average values are between 0.23 and 0.55. For other data sets in Appendix B, similar trends are evident.

This discussion of selected performance measures is intended to highlight a few features of the overall model perfomance results, and to illustrate the information presented in the tables. The comments are not intended to place particular importance on any specific performance measures, but only to introduce the material.

TABLE 4a-1. DIFFERENCE OF OBSERVED AND PREDICTED AVERAGES OF THE 25 HIGHEST SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION) CLIFTY CREEK (1975) AVERAGING TIME: 1 HOUR

Data Sets	Average Observed Value $\bar{C}_o$ ($\mu g/m^3$)	Difference of Averages ($\bar{C}_o - \bar{C}_p$) For Each Model ($\mu g/m^3$)			
		MPTER	MPSDM	COMPTER	SCSTER
1. All stations/all events (A - 4a)	790.8	-286.9 (-403.1, -170.7)	-423.6 (-643.5, -203.7)	-339.6 (-454.8, -224.4)	-69.3 (-185.8, 47.2)
2. By station/all events (A - 4b)					
Station 1	508.9	-86.1 (-146.5, -25.7)	-7.1 (-75.7, 61.5)	-172.1 (-228.3, -115.9)	26.8 (-38.4, 92.0)
Station 2	535.0	-310.0 (-397.5, -222.5)	-200.2 (-309.7, -90.7)	-333.6 (-418.0, -249.2)	-141.8 (-214.2, -69.4)
Station 3	580.0	-355.0 (-480.2, -229.8)	-411.0 (-597.5, -224.5)	-428.8 (-554.8, -302.8)	-140.1 (-271.1, -9.1)
Station 4	550.0	-117.8 (-193.4, -42.2)	-38.0 (-128.6, 52.6)	-141.8 (-214.8, -68.8)	22.7 (-40.5, 85.9)
Station 5	225.9	-89.4 (-251.5, 72.7)	-337.7 (-566.1, -109.3)	-266.3 (-414.2, -118.4)	23.0 (-101.0, 147.0)
Station 6	512.6	60.8 (-56.2, 177.8)	44.0 (-67.9, 155.9)	24.6 (-90.7, 139.9)	62.2 (-54.8, 179.2)
3. By meteorological condition (A - 5)					
a. Wind Speed					
<2.5 m/sec	653.5	-210.2 (-303.4, -117.0)	-517.1 (-737.5, -296.7)	-268.5 (-359.4, -177.6)	-95.8 (-190.7, -0.9)
2.5 to 5 m/sec	652.0	-369.3 (-492.2, -246.4)	-118.0 (-232.6, -3.4)	-420.6 (-543.3, -297.9)	-111.9 (-230.1, 6.3)
>5 m/sec	489.9	-68.0 (-130.9, -5.1)	167.0 (111.8, 222.2)	-129.5 (-189.2, -69.8)	259.1 (200.6, 317.6)
b. Stability Group					
Class A & B	481.3	-481.7 (-574.7, -388.7)	-552.4 (-767.9, -336.9)	-522.1 (-616.0, -428.2)	-350.0 (-443.9, -272.1)
Class C	678.9	-247.9 (-367.0, -128.8)	-335.8 (-500.0, -171.6)	-311.0 (-428.8, -193.2)	20.4 (-85.8, 126.6)
Class D	586.6	28.1 (-19.0, 75.2)	243.9 (209.1, 278.7)	-32.8 (-75.4, 9.8)	350.5 (312.0, 389.0)
Class E & F	398.0	56.2 (-49.2, 161.6)	361.8 (257.8, 465.8)	-207.9 (-315.9, -99.9)	325.7 (223.2, 428.2)

TABLE 4a-2. DIFFERENCE OF OBSERVED AND PREDICTED AVERAGES OF THE 25 HIGHEST SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)
CLIFTY CREEK (1975) AVERAGING TIME: 1 HOUR

Data Sets	Average Observed Value $\bar{C}_o$ (μg/m³)	Difference of Averages ($\bar{C}_o - \bar{C}_p$) For Each Model (μg/m³)			
		3141	4141	TEM-8A	MULTIMAX
1. All stations/all events (A - 4a)	790.8	233.8 (131.2, 336.4)	233.8 (131.2, 336.4)	-160.8 (-309.8, -11.8)	-48.9 (-167.8, 70.0)
2. By station/all events (A - 4b)					
Station 1	508.9	190.3 (145.8, 234.8)	109.3 (145.8, 234.8)	18.2 (-53.1, 89.5)	32.8 (-33.8, 99.4)
Station 2	535.0	107.6 (51.4, 163.8)	107.6 (51.4, 163.8)	1.5 (-89.5, 92.5)	-110.3 (-187.7, -32.9)
Station 3	580.0	112.0 (-2.6, 226.6)	112.0 (-2.6, 226.6)	-140.5 (-344.6, 63.6)	-110.3 (-243.8, 23.2)
Station 4	550.0	161.9 (100.8, 223.0)	161.9 (100.8, 223.0)	-82.9 (-157.4, -8.4)	43.5 (-22.7, 109.7)
Station 5	225.9	-14.1 (-89.8, 61.6)	-14.1 (-89.8, 61.6)	-22.3 (-95.6, 51.0)	30.3 (-86.2, 146.8)
Station 6	512.6	206.6 (107.0, 306.2)	206.6 (107.0, 306.2)	121.0 (3.3, 238.7)	65.0 (-51.4, 181.4)
3. By meteorological condition (A - 5)					
a. Wind Speed					
<2.5 m/sec	653.5	138.5 (54.7, 222.3)	138.5 (54.7, 222.3)	-133.4 (-223.1, -43.7)	-82.5 (-179.9, 14.9)
2.5 to 5 m/sec	652.0	184.7 (82.9, 286.5)	184.7 (82.9, 286.5)	-42.2 (-202.8, 118.4)	-77.1 (-196.8, 42.6)
>5 m/sec	489.9	308.5 (251.4, 365.6)	308.5 (251.4, 365.6)	275.0 (121.2, 428.8)	218.0 (162.1, 273.9)
b. Stability Group					
Class A & B	481.3	-60.6 (-121.0, -0.2)	-60.6 (-121.0, -0.2)	-181.5 (-274.3, -88.7)	-337.8 (-426.1, -249.5)
Class C	678.9	251.2 (147.3, 355.1)	251.2 (147.3, 355.1)	-192.9 (-355.4, -30.4)	54.2 (-52.3, 160.7)
Class D	586.6	415.4 (377.0, 453.8)	415.4 (377.0, 435.8)	375.2 (311.2, 439.2)	313.0 (276.2, 349.8)
Class E & F	398.0	336.9 (234.8, 439.0)	246.6 (144.2, 349.0)	389.3 (287.3, 491.4)	170.3 (66.9, 273.7)

TABLE 4b-1. DIFFERENCE OF OBSERVED AND PREDICTED AVERAGES OF THE 25 HIGHEST SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION) CLIFTY CREEK (1975) AVERAGING TIME: 3 HOUR

Data Sets	Average Observed Value $\bar{C}_o$ (μg/m³)	Difference of Averages ($\bar{C}_o - \bar{C}_p$) For Each Model (μg/m³)			
		MPTER	MPSDM	COMPTER	SCSTER
1. All stations/all events (A - 4a)	476.3	-43.7 (-99.5, 12.1)	-83.3 (-191.3, 24.7)	-95.6 (-153.0, -38.2)	62.9 (6.0, 119.8)
2. By station/all events (A - 4b)					
Station 1	322.6	12.2 (-27.4, 51.8)	78.8 (41.8, 115.8)	-27.1 (-69.7, 15.5)	119.0 (79.3, 158.7)
Station 2	286.6	-106.6 (-174.1, -39.1)	-14.3 (-63.3, 34.7)	-141.6 (-203.4, -79.8)	-12.2 (-77.7, 53.3)
Station 3	315.9	-87.5 (-159.3, -15.7)	-156.0 (-244.0, -68.0)	-161.6 (-237.8, -85.4)	20.5 (-50.7, 91.7)
Station 4	313.3	-17.7 (-70.7, 35.3)	51.7 (3.4, 100.0)	-66.0 (-115.8, -16.2)	81.5 (30.3, 132.7)
Station 5	125.6	25.7 (-40.2, 91.6)	-108.7 (-233.4, 16.0)	-49.0 (-111.6, 13.6)	57.8 (6.9, 108.7)
Station 6	257.9	94.7 (33.2, 156.2)	70.9 (13.7, 128.1)	75.2 (14.3, 136.1)	95.3 (33.8, 156.8)
3. By meteorological condition (A - 5)					
a. Wind Speed					
<2.5 m/sec	316.2	-28.5 (-97.4, 40.4)	-181.7 (-300.8, -62.6)	-80.2 (-147.8, -12.6)	33.2 (-34.4, 100.8)
2.5 to 5 m/sec	410.5	-63.6 (-121.3, -5.9)	12.6 (-40.9, 66.1)	-114.2 (-173.6, -54.8)	41.1 (-11.2, 93.4)
>5 m/sec	308.1	-8.8 (-65.0, 47.4)	113.9 (62.8, 165.1)	-65.1 (-121.2, -9.0)	179.3 (126.6, 232.0)
b. Stability Group					
Class A & B	228.3	-183.4 (-255.0, -111.8)	-134.9 (-198.1, -71.7)	-209.4 (-282.1, -136.7)	-132.9 (-203.0, -62.8)
Class C	359.0	-82.1 (-147.3, -16.9)	-152.2 (-271.8, -32.6)	-128.4 (-197.8, -59.0)	37.2 (-20.8, 95.2)
Class D	385.5	37.2 (-3.6, 78.0)	131.8 (89.2, 174.4)	-22.4 (-63.1, 18.3)	197.7 (158.9, 236.5)
Class E & F	196.9	44.7 (-10.6, 100.0)	164.1 (115.6, 212.6)	-66.6 (-128.8, -4.4)	164.6 (116.3, 212.9)

TABLE 4b-2. DIFFERENCE OF OBSERVED AND PREDICTED AVERAGES OF THE 25 HIGHEST SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)
CLIFTY CREEK (1975) AVERAGING TIME: 3 HOUR

Data Sets	Average Observed Value $\bar{C}_o$ ($\mu g/m^3$)	Difference of Averages ($\bar{C}_o - \bar{C}_p$) For Each Model ($\mu g/m^3$)			
		3141	4141	TEM-8A	MULTIMAX
1. All stations/all events (A - 4a)	476.3	179.4 (133.5, 225.3)	179.4 (133.5, 225.3)	39.6 (-41.4, 120.6)	74.6 (17.6, 131.6)
2. By station/all events (A - 4b)					
Station 1	322.6	162.0 (127.7, 196.3)	159.5 (125.6, 193.4)	91.0 (43.2, 138.8)	113.5 (74.3, 152.7)
Station 2	286.6	60.1 (13.9, 106.3)	60.1 (13.9, 106.3)	26.4 (-20.7, 73.5)	-0.6 (-65.6, 64.4)
Station 3	315.9	91.9 (25.9, 157.9)	91.9 (25.9, 157.9)	-20.4 (-125.3, 84.5)	30.7 (-40.4, 101.8)
Station 4	313.3	119.4 (73.7, 165.1)	118.8 (73.1, 164.5)	20.0 (-25.9, 65.9)	86.9 (36.8, 137.0)
Station 5	125.6	31.7 (-7.7, 71.1)	31.7 (-7.7, 71.1)	27.1 (-10.7, 64.9)	60.3 (11.2, 109.4)
Station 6	257.9	120.3 (65.3, 175.3)	120.3 (65.3, 175.3)	61.6 (6.2, 117.0)	96.0 (34.9, 157.1)
3. By meteorological condition (A - 5)					
a. Wind Speed					
<2.5 m/sec	316.2	92.6 (39.3, 145.9)	92.0 (38.8, 145.2)	9.7 (-41.9, 61.3)	40.8 (-26.3, 107.9)
2.5 to 5 m/sec	410.5	144.7 (99.5, 189.9)	144.7 (99.5, 189.9)	26.0 (-59.2, 111.2)	55.0 (2.4, 107.6)
>5 m/sec	308.1	195.4 (144.8, 246.0)	195.4 (144.8, 246.0)	214.1 (147.2, 281.0)	154.1 (102.0, 206.2)
b. Stability Group					
Class A & B	228.3	-37.4 (-96.7, 21.9)	-37.4 (-96.7, 21.9)	-72.9 (-141.1, -4.7)	-126.1 (-195.7, -56.5)
Class C	359.0	112.6 (61.3, 163.9)	112.6 (61.3, 163.9)	-27.5 (-114.0, 59.0)	52.9 (-4.6, 110.4)
Class D	385.5	251.2 (214.0, 288.4)	250.6 (213.3, 287.9)	214.4 (167.8, 261.0)	193.5 (155.1, 231.9)
Class E & F	196.9	166.1 (118.3, 213.9)	118.8 (70.3, 167.3)	193.5 (145.9, 241.1)	96.9 (46.4, 147.4)

TABLE 4c. DIFFERENCE OF OBSERVED AND PREDICTED AVERAGES OF THE 25 HIGHEST SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION) CLIFTY CREEK (1975) AVERAGING TIME: 24 HOUR

Data Sets	Average Observed Value $\bar{C}_o$ ($\mu g/m^3$)	Difference of Averages ($\bar{C}_o - \bar{C}_p$) For Each Model ($\mu g/m^3$)							
		MPTER	MPSDM	COMPTER	SCSTER	3141	4141	TEM-8A	MULTIMAX
1. All stations/all events (A - 4a)	126.7	8.3 (±16.9)	18.0 (±18.6)	-20.3 (±20.2)	54.1 (±14.7)	63.6 (±14.3)	62.7 (±14.3)	46.5 (±15.2)	52.1 (±14.3)
2. By station/all events (A - 4b)									
Station 1	97.4	35.6 (±17.6)	49.1 (±15.1)	20.5 (±19.4)	62.7 (±14.4)	62.0 (±14.4)	59.0 (±14.3)	52.9 (±15.1)	59.2 (±14.4)
Station 2	65.4	-2.6 (±17.6)	8.9 (±15.0)	-15.8 (±17.7)	19.6 (±14.9)	25.5 (±13.5)	25.4 (±13.5)	19.7 (±12.9)	19.3 (±14.7)
Station 3	78.1	+3.0 (±19.9)	-9.3 (±20.9)	-27.3 (±22.0)	28.4 (±18.1)	34.5 (±17.3)	34.5 (±17.2)	20.9 (±19.3)	29.4 (±17.8)
Station 4	84.5	5.7 (±15.4)	24.9 (±11.4)	-15.9 (±20.2)	39.3 (±8.9)	39.4 (±8.4)	37.9 (±8.5)	27.5 (±10.1)	35.1 (±9.6)
Station 5	34.9	19.1 (±11.2)	1.5 (±17.1)	4.5 (±12.9)	24.6 (±8.4)	20.6 (±7.0)	20.6 (±7.0)	18.5 (±7.5)	24.8 (±8.2)
Station 6	57.5	29.1 (±14.7)	25.3(±13.8)	25.9 (±14.8)	29.3 (±14.7)	31.4 (±13.7)	31.5 (±13.7)	21.0 (±13.1)	29.4 (±14.6)

TABLE 5a-1. DIFFERENCE OF OBSERVED AND PREDICTED AVERAGES OF THE 25 HIGHEST SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION) CLIFTY CREEK (1976) AVERAGING TIME: 1 HOUR

Data Sets	Average Observed Value $\bar{C}_O$ ($\mu g/m^3$)	Difference of Averages ($\bar{C}_O - \bar{C}_p$) For Each Model ($\mu g/m^3$)			
		MPTER	MPSDM	COMPTER	SCSTER
1. All stations/all events (A - 4a)	771.8	-313.0 (-369.3, -256.7)	-233.2 (-326.2, -140.2)	-374.9 (-427.8, -322.0)	-135.1 (-205.2, -65.0)
2. By station/all events (A - 4b)					
Station 1	581.7	18.7 (-41.6, 79.0)	23.1 (-84.6, 130.8)	-81.7 (-147.8, -15.6)	121.6 (67.1, 176.1)
Station 2	658.9	-123.0 (-201.0, -45.0)	12.4 (-57.9, 82.7)	-169.8 (-248.0, -91.6)	25.5 (-57.4, 108.4)
Station 3	450.2	-578.5 (-643.0, -514.0)	-410.7 (-507.2, -314.2)	-665.8 (-723.0, -608.6)	-341.6 (-414.7, -268.5)
Station 4	546.7	-143.6 (-211.8, -75.4)	-82.2 (-167.0, 2.6)	-161.9 (-227.0, -96.8)	-29.2 (-92.6, 34.2)
Station 5	321.3	28.1 (-124.5, 180.7)	-287.6 (-423.5, -151.7)	-201.9 (-352.4, -51.4)	133.0 (-6.6, 272.6)
Station 6	496.8	-35.7 (-113.9, 42.5)	-7.5 (-70.1, 55.1)	-60.6 (-133.1, 11.9)	-34.0 (-112.4, 44.4)
3. By meteorological condition (A - 5)					
a. Wind Speed					
<2.5 m/sec	669.0	-284.5 (-365.9, -203.1)	-331.7 (-435.3, -228.1)	-353.4 (-420.2, -278.6)	-157.6 (-246.4, -68.8)
2.5 to 5 m/sec	667.5	-284.8 (-350.3, -219.3)	-24.4 (-79.7, 30.9)	-379.6 (-445.6, -313.6)	-61.9 (-134.3, 10.5)
>5 m/sec	458.5	-141.9 (-237.5, -46.3)	137.6 (86.3, 188.9)	-182.6 (-273.0, -92.2)	140.4 (55.8, 225.0)
b. Stability Group					
Class A & B	541.4	-462.0 (-548.2, -375.8)	-329.3 (-426.9, -231.7)	-511.6 (-593.0, -430.2)	-352.6 (-439.1, -266.1)
Class C	631.4	-308.0 (-381.7, -234.3)	-261.5 (-360.4, -162.6)	-405.0 (-480.9, -329.1)	-37.0 (-102.9, 28.9)
Class D	672.4	154.9 (113.9, 195.9)	306.9 (251.1, 362.7)	103.2 (63.0, 143.4)	422.2 (382.0, 462.4)
Class E & F	343.5	-28.4 (-80.9, 24.1)	323.6 (281.6, 365.6)	-296.6 (-351.1, -240.1)	259.7 (219.3, 300.1)

TABLE 5a-2. DIFFERENCE OF OBSERVED AND PREDICTED AVERAGES OF THE 25 HIGHEST SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION) CLIFTY CREEK (1976) AVERAGING TIME: 1 HOUR

Data Sets	Average Observed Value $\bar{C}_o$ ($\mu g/m^3$)	Difference of Averages ($\bar{C}_o - \bar{C}_p$) For Each Model ($\mu g/m^3$)			
		3141	4141	TEM-8A	MULTIMAX
1. All stations/all events (A - 4a)	771.8	206.2 (152.1, 260.3)	206.2 (152.1, 260.3)	38.9 (-46.0, 123.8)	-119.8 (-193.4, -46.2)
2. By station/all events (A - 4b)					
Station 1	581.7	282.1 (237.4, 326.8)	282.1 (237.4, 326.8)	197.7 (123.6, 271.8)	134.2 (79.6, 188.8)
Station 2	658.9	242.0 (178.7, 305.3)	242.0 (178.7, 305.3)	302.6 (224.2, 381.0)	72.9 (-15.1, 160.9)
Station 3	450.2	-75.8 (-133.1, -18.5)	-75.8 (-133.1, -18.5)	6.5 (-95.9, 108.9)	-316.9 (-393.4, -240.4)
Station 4	546.7	142.9 (97.1, 188.7)	142.9 (97.1, 188.7)	36.1 (-39.1, 111.3)	-14.0 (-76.1, 48.1)
Station 5	321.3	125.3 (31.6, 219.0)	125.3 (31.6, 219.0)	76.0 (-14.1, 166.1)	132.4 (-4.4, 269.2)
Station 6	496.8	147.6 (101.5, 193.7)	147.6 (101.5, 193.7)	62.5 (-27.1, 152.1)	-27.2 (-110.1, 55.7)
3. By meteorological condition (A - 5)					
a. Wind Speed					
<2.5 m/sec	669.0	146.1 (74.1, 218.1)	146.1 (74.1, 218.1)	-42.6 (-138.7, 53.5)	-154.0 (-247.3, -60.7)
2.5 to 5 m/sec	667.5	185.8 (136.7, 234.9)	185.8 (136.7, 234.9)	282.1 (227.7, 336.5)	-22.1 (-93.2, 49.0)
>5 m/sec	458.5	259.4 (194.6, 324.2)	259.4 (194.6, 324.2)	306.3 (223.0, 389.6)	136.6 (62.8, 210.4)
b. Stability Group					
Class A & B	541.4	-17.6 (-88.7, 53.5)	-17.6 (-88.7, 53.5)	-18.7 (-115.4, 78.0)	-348.6 (-434.8, -262.4)
Class C	631.4	191.1 (128.8, 253.4)	191.1 (128.8, 253.4)	1.2 (-96.2, 98.6)	16.3 (-47.3, 79.9)
Class D	672.4	522.1 (483.3, 560.9)	522.1 (483.3, 560.9)	454.4 (393.6, 515.2)	399.7 (358.7, 440.7)
Class E & F	343.5	277.4 (238.3, 316.5)	184.6 (144.8, 224.4)	281.1 (223.6, 338.6)	96.3 (52.8, 139.8)

TABLE 5b-1. DIFFERENCE OF OBSERVED AND PREDICTED AVERAGES OF THE 25 HIGHEST SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION) CLIFTY CREEK (1976) AVERAGING TIME: 3 HOUR

Data Sets	Average Observed Value $\bar{C}_o$ ($\mu g/m^3$)	Difference of Averages ($\bar{C}_o - \bar{C}_p$) For Each Model ($\mu g/m^3$)			
		MPTER	MPSDM	COMPTER	SCSTER
1. All stations/all events (A - 4a)	480.9	-54.2 (-105.4, -3.0)	-45.4 (-103.6, 12.8)	-127.0 (-184.2, -69.8)	66.7 (22.3, 111.1)
2. By station/all events (A - 4b)					
Station 1	372.7	49.5 (2.4, 96.6)	113.1 (71.9, 154.3)	-6.6 (-58.4, 45.2)	154.4 (113.1, 195.7)
Station 2	373.6	56.1 (1.5, 110.7)	97.3 (47.0, 147.6)	14.1 (-39.1, 67.3)	123.0 (70.8, 175.2)
Station 3	252.8	-191.5 (-261.9, -121.1)	-209.8 (-283.0, -136.6)	-279.5 (-352.1, -206.9)	-65.9 (-124.1, -7.7)
Station 4	360.2	24.0 (-32.0, 80.0)	49.4 (-15.0, 113.8)	-9.6 (-64.1, 44.9)	109.2 (58.0, 160.4)
Station 5	177.1	62.5 (-10.2, 135.2)	-55.8 (-119.0, 7.4)	-36.3 (-109.2, 36.6)	104.5 (42.1, 166.9)
Station 6	287.8	78.0 (29.1, 126.9)	90.0 (56.2, 123.8)	65.1 (16.8, 113.4)	78.7 (29.9, 127.5)
3. By meteorological condition (A - 5)					
a. Wind Speed					
<2.5 m/sec	338.6	-38.5 (-87.9, 10.9)	-120.3 (-182.8, -57.8)	-87.6 (-136.8, -38.4)	29.2 (-11.5, 69.9)
2.5 to 5 m/sec	445.5	-61.6 (-120.5, -2.7)	25.6 (-29.8, 81.0)	-130.1 (-196.6, -63.6)	46.7 (-1.8, 95.2)
>5 m/sec	316.0	6.0 (-46.0, 58.0)	129.4 (84.4, 174.4)	-42.6 (-97.7, 12.5)	156.0 (109.3, 202.7)
b. Stability Group					
Class A & B	263.8	-163.0 (-225.0, -101.0)	-165.7 (-238.7, -92.7)	-192.5 (-258.4, -126.6)	-103.3 (-155.8, -50.8)
Class C	364.3	-89.4 (-151.1, -27.7)	-73.1 (-128.5, -17.7)	-150.9 (-219.4, -82.4)	22.5 (-26.0, 71.0)
Class D	443.1	107.1 (69.0, 145.2)	187.9 (153.9, 221.9)	42.6 (2.1, 83.1)	236.1 (203.1, 269.1)
Class E & F	217.9	47.1 (-4.8, 99.0)	185.8 (149.0, 222.6)	-71.9 (-131.3, -12.5)	182.8 (146.8, 218.8)

TABLE 5b-2. DIFFERENCE OF OBSERVED AND PREDICTED AVERAGES OF THE 25 HIGHEST SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)
CLIFTY CREEK (1976) AVERAGING TIME: 3 HOUR

Data Sets	Average Observed Value $\bar{C}_O$ ($\mu g/m^3$)	Difference of Averages ($\bar{C}_O - \bar{C}_p$) For Each Model ($\mu g/m^3$)			
		3141	4141	TEM-8A	MULTIMAX
1. All stations/all events (A - 4a)	480.9	190.3 (154.7, 225.9)	190.3 (154.7, 225.9)	147.4 (93.6, 201.2)	86.2 (42.0, 130.4)
2. By station/all events (A - 4b)					
Station 1	372.7	209.0 (175.1, 242.9)	205.8 (172.0, 239.6)	180.6 (141.7, 219.5)	147.1 (106.2, 188.0)
Station 2	373.6	179.4 (136.1, 222.7)	179.4 (136.1, 222.7)	186.8 (141.0, 232.6)	143.6 (91.6, 195.6)
Station 3	252.8	12.5 (-31.0, 56.0)	12.5 (-31.0, 56.0)	11.8 (-49.9, 73.5)	-53.0 (-109.3, 3.3)
Station 4	360.2	156.6 (110.8, 202.4)	156.6 (110.8, 202.4)	122.6 (69.8, 175.4)	119.8 (72.3, 167.3)
Station 5	177.1	96.9 (47.9, 145.9)	96.9 (47.9, 145.9)	78.4 (35.9, 120.9)	104.8 (43.8, 165.8)
Station 6	287.8	130.1 (96.6, 163.6)	130.1 (96.6, 163.6)	93.5 (58.8, 128.2)	81.6 (31.7, 131.5)
3. By meteorological condition (A - 5)					
a. Wind Speed					
<2.5 m/sec	338.6	111.3 (74.3, 148.3)	111.3 (74.3, 148.3)	36.4 (-19.2, 92.0)	40.0 (-0.3, 80.3)
2.5 to 5 m/sec	445.5	170.8 (132.3, 209.3)	170.8 (132.3, 209.3)	202.2 (160.4, 244.0)	65.2 (17.6, 112.8)
>5 m/sec	316.0	191.8 (146.4, 237.2)	191.8 (146.4, 237.2)	231.6 (185.3, 277.9)	147.0 (100.8, 193.2)
b. Stability Group					
Class A & B	263.8	9.3 (-33.9, 52.5)	9.3 (-33.9, 52.5)	-4.9 (-65.7, 55.9)	-93.5 (-144.3, -42.7)
Class C	364.3	113.1 (71.8, 154.4)	113.1 (71.8, 154.4)	108.5 (60.8, 156.2)	44.9 (-2.5, 92.3)
Class D	443.1	306.3 (274.9, 337.7)	306.3 (274.9, 337.7)	271.3 (228.0, 314.6)	236.4 (203.4, 269.4)
Class E & F	217.9	183.0 (148.0, 218.0)	138.7 (101.6, 175.8)	200.0 (163.1, 236.9)	106.3 (64.6, 148.0)

TABLE 5c. DIFFERENCE OF OBSERVED AND PREDICTED AVERAGES OF THE 25 HIGHEST SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)
CLIFTY CREEK (1976) AVERAGING TIME: 24 HOUR

Data Sets	Average Observed Value $\bar{C}_o$ ($\mu g/m^3$)	Difference of Averages ($\bar{C}_o - \bar{C}_p$) For Each Model ($\mu g/m^3$)							
		MPTER	MPSDM	COMPTER	SCSTER	3141	4141	TEM-8A	MULTIMAX
1. All stations/all events (A - 4a)	125.3	-1.4 (±9.1)	23.3 (±13.2)	-26.8 (±16.3)	39.7 (±13.8)	55.4 (±10.3)	53.4 (±10.1)	58.5 (±9.5)	40.3 (±13.4)
2. By station/all events (A - 4b)									
Station 1	96.4	20.8 (±14.2)	40.0 (±11.0)	6.6 (±15.9)	49.2 (±11.3)	52.5 (±9.4)	49.6 (±9.7)	55.0 (±9.5)	45.3 (±11.5)
Station 2	84.8	27.4 (±12.1)	36.6 (±9.7)	13.9 (±12.6)	41.0 (±11.2)	45.4 (±9.2)	45.2 (±9.2)	46.1 (±15.9)	43.2 (±10.9)
Station 3	64.3	-27.8 (±21.3)	-19.7 (±17.8)	-60.5 (±20.1)	.9 (±18.3)	10.9 (±14.2)	10.9 (±14.2)	18.4 (±12.8)	2.5 (±17.7)
Station 4	107.7	15.8 (±15.4)	36.2 (±14.1)	-2.4 (±17.6)	53.0 (±12.8)	53.7 (±12.0)	52.4 (±12.0)	55.2 (±12.4)	48.9 (±12.5)
Station 5	40.1	24.4 (±11.8)	7.2 (±11.6)	6.3 (±13.7)	30.2 (±10.3)	27.5 (±9.0)	27.5 (±9.0)	24.9 (±8.2)	30.3 (±10.1)
Station 6	71.8	43.8 (±10.0)	40.2 (±9.7)	40.3 (±10.1)	44.0 (±10.0)	47.2 (±9.0)	47.2 (±8.9)	36.1 (±8.6)	45.0 (±9.9)

TABLE 6a. AVERAGE DIFFERENCE BETWEEN OBSERVED AND PREDICTED CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)
CLIFTY CREEK (1975) AVERAGING TIME: 1 HOUR

Data Sets	Number of Events*	Average Observed Value $\bar{C}_o$* ($\mu g/m^3$)	Difference of Averages ($\overline{C_o - C_p}$) For Each Model ($\mu g/m^3$)							
			MPTER	MPSDM	COMPTER	SCSTER	3141	4141	TEM-8A	MULTIMAX
1. Highest concentration, event-by-event (A-1)	3576	115.1	34.9 (±9.7)	31.0 (±10.0)	-3.4 (±10.0)	71.9 (±8.4)	71.3 (±7.6)	67.7 (±7.7)	68.2 (±8.8)	65.3 (±8.3)
2. All concentrations, all stations (paired in time and location) (B-3)	5561	93.2	36.5 (±6.8)	33.2 (±6.9)	9.0 (±7.1)	62.7 (±5.8)	56.2 (±5.4)	53.9 (±5.5)	45.8 (±6.2)	58.1 (±5.8)
3. All concentrations, by station (B-1)										
Station 1	1357	95.3	42.2 (±14.4)	51.9 (±13.0)	24.9 (±15.5)	69.5 (±12.0)	59.8 (±11.5)	55.4 (±11.7)	58.6 (±12.9)	63.4 (±12.3)
Station 2	825	102.9	25.6 (±18.7)	29.7 (±10.6)	-1.2 (±18.1)	57.6 (±17.8)	54.8 (±15.9)	54.3 (±15.7)	43.1 (±15.8)	53.6 (±16.8)
Station 3	1037	92.0	35.3 (±17.3)	10.7 (±14.7)	-11.9 (±17.5)	60.7 (±14.8)	57.9 (±14.2)	57.9 (±14.2)	39.6 (±15.1)	58.8 (±14.4)
Station 4	995	100.1	6.8 (±16.8)	19.8 (±10.5)	-30.0 (±17.8)	59.6 (±13.4)	48.5 (±11.8)	41.8 (±11.7)	35.6 (±17.3)	46.8 (±13.7)
Station 5	694	59.6	46.1 (±8.5)	30.4 (±12.6)	27.8 (±10.6)	51.1 (±6.7)	46.0 (±7.1)	46.0 (±7.1)	43.8 (±7.1)	51.1 (±6.6)
Station 6	653	103.5	75.3 (±18.2)	58.7 (±14.3)	67.5 (±18.0)	75.4 (±18.1)	70.0 (±17.5)	70.0 (±17.5)	50.6 (±18.2)	75.7 (±18.1)
4. By meteorological conditions, all stations (B-4)										
a. Wind Speed										
< 2.5 m/sec	2271	88.3	43.4 (±9.8)	14.9 (±12.3)	18.2 (±10.2)	57.4 (±9.1)	50.0 (±8.6)	47.9 (±8.6)	23.8 (±9.8)	55.9 (±9.0)
2.5 to 5 m/sec	2819	91.2	32.0 (±9.4)	44.2 (±7.9)	2.7 (±10.1)	60.3 (±7.8)	56.2 (±7.0)	53.2 (±7.1)	55.2 (±7.7)	54.8 (±7.8)
> 5 m/sec	471	128.3	29.8 (±31.4)	59.9 (±24.5)	0.7 (±31.6)	103.9 (±23.6)	86.5 (±24.8)	86.5 (±24.7)	111.7 (±24.4)	89.3 (±23.1)
b. Stability Group										
Class A & B	565	101.9	-34.9 (±29.4)	-53.4 (±35.3)	-41.7 (±30.8)	-16.3 (±27.3)	-16.2 (±20.3)	-16.2 (±20.3)	-51.8 (±17.9)	-12.9 (±27.1)
Class C	974	111.4	-5.5 (±22.0)	-23.2 (±21.4)	-27.9 (±24.1)	31.1 (±18.0)	20.9 (±15.2)	20.9 (±15.3)	-21.6 (±16.3)	34.6 (±17.7)
Class D	2899	98.5	63.9 (±7.2)	58.6 (±6.2)	30.5 (±7.7)	90.6 (±5.9)	85.8 (±6.1)	85.8 (±6.1)	96.3 (±5.6)	84.8 (±6.0)
Class E & F	1123	59.2	37.9 (±10.6)	63.7 (±8.4)	6.8 (±13.3)	58.7 (±8.5)	56.4 (±8.5)	44.4 (±8.9)	64.7 (±8.5)	45.4 (±9.6)

* Due to the effects of imposing a threshold cutoff value, the number of events and the average observed value differ slightly from model to model. The values listed are those for MPTER.

TABLE 6b. AVERAGE DIFFERENCE BETWEEN OBSERVED AND PREDICTED CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)
CLIFTY CREEK (1975) AVERAGING TIME: 3 HOURS

Data Sets	Number of Events*	Average Observed Value $\bar{C}_o$* ($\mu g/m^3$)	Difference of Averages ($\overline{C_o - C_p}$) For Each Model ($\mu g/m^3$)							
			MPTER	MPSDM	COMPTER	SCSTER	3141	4141	TEM-8A	MULTIMAX
1. Highest concentration, event-by-event (A-1)	1271	94.8	29.5 (± 9.2)	28.1 (±9.1)	-0.1 (±9.4)	60.3 (±8.3)	60.4 (±7.5)	56.4 (±7.4)	55.8 (±8.5)	54.5 (±8.1)
2. All concentrations, all stations (paired in time and location) (B-3)	2139	76.3	28.8 (±6.5)	26.3 (±6.5)	5.9 (±6.8)	51.7 (±5.7)	46.8 (±5.4)	44.2 (±5.3)	36.7 (±6.1)	47.6 (±5.6)
3. All concentrations, by station (B-1)										
Station 1	532	78.5	34.2 (±14.3)	43.3 (±12.2)	19.6 (±15.3)	58.1 (±12.2)	51.0 (±11.6)	45.7 (±11.6)	48.9 (±12.8)	53.6 (±12.3
Station 2	335	80.0	17.5 (±16.1)	21.6 (±14.8)	-3.5 (±15.1)	43.5 (±15.9)	43.0 (±14.3)	42.9 (±14.3)	33.2 (±15.4)	40.4 (±14.7
Station 3	396	76.5	28.9 (±16.6)	7.3 (±19.8)	-10.3 (±16.4)	49.9 (±14.4)	47.9 (±13.9)	47.8 (±13.9)	31.4 (±14.5)	48.7 (±13.9
Station 4	398	78.8	5.1 (±14.5)	15.6 (±12.8)	-23.7 (±15.5)	50.7 (±12.2)	41.4 (±11.2)	34.4 (±10.8)	27.4 (±16.3)	38.1 (±12.6
Station 5	231	52.2	38.9 (±10.6)	22.6 (±16.2)	21.8 (±11.8)	43.3 (±8.2)	39.1 (±7.8)	39.1 (±7.8)	36.3 (±8.2)	43.6 (±7.9)
Station 6	247	85.1	61.1 (±18.2)	48.4 (±17.9)	54.8 (±18.3)	61.2 (±18.2)	55.8 (±17.1)	55.8 (±17.1)	39.5 (±18.2)	61.5 (±18.1
4. By meteorological conditions, all stations (B-4)										
a. Wind Speed										
< 2.5 m/sec	595	73.4	40.4 (±11.1)	11.3 (±13.7)	18.3 (±11.7)	52.4 (±10.3)	47.0 (±9.8)	44.1 (±9.7)	20.7 (±11.2)	50.7 (±10.3
2.5 to 5 m/sec	1269	73.4	24.0 (±8.7)	29.7 (±8.0)	1.4 (±9.1)	45.9 (±7.6)	42.0 (±6.6)	39.1 (±6.8)	35.5 (±5.2)	42.0 (±7.6)
> 5 m/sec	275	95.9	26.1 (±19.9)	44.6 (±15.1)	-1.2 (±19.7)	76.9 (±14.2)	68.7 (±16.2)	68.7 (±16.2)	83.4 (±17.0)	67.2 (±14.0
b. Stability Group										
Class A & B	203	76.1	-27.6 (±24.8)	-33.6 (±22.9)	-35.8 (±27.0)	-14.5 (±22.7)	-13.3 (±17.0)	-13.4 (±16.9)	-39.1 (±16.2)	-12.3 (±23.0
Class C	408	90.5	12.0 (±10.6)	-12.0 (±20.5)	-3.6 (±20.0)	36.6 (±16.0)	26.9 (±13.8)	26.9 (±14.0)	-6.1 (±13.4)	39.7 (±15.8
Class D	1162	78.8	42.7 (±7.6)	42.2 (±6.5)	15.4 (±8.2)	68.2 (±6.1)	64.3 (±6.1)	63.2 (±6.2)	67.2 (±6.6)	62.8 (±6.1)
Class E & F	366	52.9	34.8 (±12.2)	55.5 (±9.7)	6.6 (±13.5)	55.0 (±10.0)	54.7 (±10.0)	41.3 (±10.1)	59.2 (±10.4)	42.5 (±11.1

* Due to the effects of imposing a threshold cutoff value, the number of events and the average observed value differ slightly from model to model. The values listed are those for MPTER.

TABLE 6c. AVERAGE DIFFERENCE BETWEEN OBSERVED AND PREDICTED CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)
CLIFTY CREEK (1975) AVERAGING TIME: 24 HOURS

Data Sets	Number of Events*	Average Observed Value $\bar{C}_o$* ($\mu g/m^3$)	Difference of Averages ($\overline{C_o - C_p}$) For Each Model ($\mu g/m^3$)							
			MPTER	MPSDM	COMPTER	SCSTER	3141	4141	TEM-8A	MULTIMAX
1. Highest concentration, event-by-event (A-1)	335	38.5	13.5 (±4.4)	13.3 (±4.3)	3.4 (±4.6)	24.1 (±4.6)	23.9 (±4.2)	23.1 (±4.1)	22.2 (±4.8)	22.7 (±4.2)
2. All concentrations, all stations (paired in time and location) (B-3)	1115	22.6	10.9 (±2.0)	10.3 (±2.0)	5.2 (±2.2)	16.2 (±1.8)	15.1 (±1.8)	14.5 (±1.8)	13.0 (±1.9)	15.3 (±1.8)
3. All concentrations, by station (B-1)										
Station 1	211	29.0	15.0 (±6.4)	17.5 (±6.0)	10.6 (±6.6)	21.8 (±6.2)	19.8 (±6.2)	18.6 (±4.7)	18.6 (±6.1)	20.2 (±6.0)
Station 2	184	21.5	7.5 (±3.9)	8.3 (±4.1)	2.4 (±3.8)	13.4 (±4.0)	13.1 (±3.8)	13.0 (±4.2)	11.0 (±4.4)	12.7 (±3.7)
Station 3	194	24.4	11.5 (±5.6)	6.5 (±5.8)	0.5 (±6.2)	16.9 (±4.9)	16.6 (±4.8)	16.6 (±4.5)	13.0 (±4.4)	16.5 (±4.8)
Station 4	187	24.7	4.3 (±4.4)	7.1 (±3.7)	-3.9 (±5.3)	15.7 (±4.0)	13.3 (±3.6)	11.5 (±4.2)	10.6 (±5.1)	13.0 (±4.0)
Station 5	206	13.7	11.8 (±1.8)	9.4 (±3.0)	9.2 (±2.1)	12.4 (±1.7)	11.8 (±1.8)	11.8 (±1.6)	11.6 (±1.7)	12.5 (±1.7)
Station 6	133	22.2	16.4 (±5.0)	13.3 (±4.8)	15.0 (±5.0)	16.5 (±5.0)	15.5 (±4.9)	15.5 (±4.8)	12.0 (±5.4)	16.5 (±5.0)

* Due to the effects of imposing a threshold cutoff value, the number of events and the average observed value differ slightly from model to model. The values listed are those for MPTER.

TABLE 7a. AVERAGE DIFFERENCE BETWEEN OBSERVED AND PREDICTED CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)
CLIFTY CREEK (1976) AVERAGING TIME: 1 HOUR

Data Sets	Number of Events*	Average Observed Value $\bar{C}_o$* ($\mu g/m^3$)	Difference of Averages ($\overline{C_o - C_p}$) For Each Model ($\mu g/m^3$)							
			MPTER	MPSDM	COMPTER	SCSTER	3141	4141	TEM-8A	MULTIMAX
1. Highest concentration, event-by-event (A-1)	4127	127.7	45.9 (±8.9)	50.0 (±8.5)	7.4 (±9.5)	82.4 (±7.6)	82.8 (±7.1)	79.7 (±7.1)	89.0 (±7.8)	76.2 (±7.4)
2. All concentrations, all stations (paired in time and location) (B-3)	6523	99.1	41.8 (±6.9)	44.4 (±6.3)	14.5 (±7.4)	67.7 (±5.9)	62.1 (±5.5)	59.9 (±5.6)	62.4 (±5.8)	63.3 (±5.9)
3. All concentrations, by station (B-1)										
Station 1	1515	100.0	42.6 (±15.8)	56.6 (±13.9)	28.3 (±16.9)	69.1 (±13.6)	61.9 (±12.8)	58.2 (±13.0)	71.2 (±13.5)	64.2 (±14.0
Station 2	1202	102.9	58.9 (±14.6)	59.6 (±13.5)	34.6 (±15.6)	78.2 (±13.7)	73.4 (±13.2)	72.6 (±9.7)	70.1 (±12.8)	74.9 (±13.1
Station 3	1114	85.9	11.8 (±19.2)	9.1 (±17.6)	-38.7 (±18.8)	44.3 (±15.6)	42.9 (±13.8)	42.9 (±13.8)	43.1 (±13.7)	41.8 (±14.7
Station 4	1331	102.4	11.0 (±17.0)	27.8 (±15.5)	-18.6 (±18.0)	58.8 (±15.0)	49.5 (±13.0)	44.2 (±12.9)	57.0 (±16.0)	47.7 (±14.8
Station 5	485	78.2	55.0 (±13.4)	34.6 (±15.6)	27.8 (±15.6)	66.4 (±11.9)	61.3 (±11.1)	61.3 (±11.1)	54.9 (±11.6)	66.3 (±11.8
Station 6	876	115.9	92.1 (±12.1)	79.9 (±11.5)	86.1 (±12.1)	92.2 (±12.0)	89.9 (±11.7)	89.9 (±11.7)	72.8 (±12.7)	92.9 (±12.0
4. By meteorological conditions, all stations (B-4)										
a. Wind Speed										
< 2.5 m/sec	2184	92.0	38.9 (±11.5)	18.6 (±11.6)	12.6 (±12.2)	53.6 (±10.2)	47.9 (±9.2)	45.6 (±9.3)	29.8 (±10.3)	52.3 (±10.0
2.5 to 5 m/sec	3873	100.7	46.6 (±9.0)	59.0 (±7.8)	19.4 (±9.8)	74.3 (±7.7)	68.6 (±7.3)	66.2 (±7.3)	78.3 (±7.0)	69.0 (±7.7)
> 5 m/sec	466	119.1	15.1 (±30.1)	50.7 (±22.0)	-17.2 (±31.2)	80.8 (±22.6)	77.4 (±20.6)	77.4 (±20.7)	108.8 (±20.0)	68.1 (±22.1
b. Stability Group										
Class A & B	544	113.2	-28.0 (±35.0)	-29.4 (±31.9)	-40.7 (±36.0)	-10.9 (±32.0)	-7.6 (±23.7)	-7.6 (±23.7)	-36.5 (±21.5)	-8.3 (±31.1
Class C	1229	111.1	-6.9 (±21.7)	-4.4 (±19.1)	-28.3 (±24.0)	25.1 (±17.4)	16.8 (±15.1)	16.8 (±15.1)	10.0 (±13.9)	30.2 (±16.8
Class D	3513	107.0	70.6 (±7.6)	67.0 (±7.1)	37.6 (±8.4)	99.1 (±6.4)	94.0 (±6.4)	94.0 (±6.4)	108.0 (±6.3)	92.6 (±6.6)
Class E & F	1237	58.6	38.9 (±9.4)	63.4 (±5.4)	10.7 (±12.6)	58.3 (±6.0)	56.5 (±6.0)	45.4 (±7.0)	62.3 (±5.9)	46.1 (±8.0)

* Due to the effects of imposing a threshold cutoff value, the number of events and the average observed value differ slightly from model to model. The values listed are those for MPTER.

TABLE 7b. AVERAGE DIFFERENCE BETWEEN OBSERVED AND PREDICTED CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)
CLIFTY CREEK (1976) AVERAGING TIME: 3 HOURS

Data Sets	Number of Events*	Average Observed Value $\bar{C}_o$* ($\mu g/m^3$)	Difference of Averages $(\bar{C}_o - \bar{C}_p)$ For Each Model ($\mu g/m^3$)							
			MPTER	MPSDM	COMPTER	SCSTER	3141	4141	TEM-8A	MULTIMAX
1. Highest concentration, event-by-event (A-1)	1478	105.6	39.5 (±8.7)	42.4 (±7.8)	9.1 (±9.2)	68.7 (±7.5)	69.8 (±6.8)	66.8 (±6.9)	73.3 (±7.5)	64.0 (±7.3
2. All concentrations, all stations (paired in time and location) (B-3)	2525	81.6	33.5 (±6.6)	35.9 (±5.8)	10.8 (±7.1)	55.2 (±5.7)	51.3 (±5.2)	49.3 (±5.3)	50.8 (±5.4)	51.5 (±5.7
3. All concentrations, by station (B-1)										
Station 1	598	81.8	34.1 (±15.2)	45.9 (±12.6)	22.2 (±16.4)	56.4 (±13.1)	52.5 (±11.9)	49.0 (±12.2)	60.0 (±12.3)	51.8 (±13.
Station 2	460	86.7	49.3 (±12.6)	48.6 (±10.8)	27.4 (±13.0)	64.2 (±11.8)	60.5 (±11.0)	60.4 (±9.2)	57.2 (±10.8)	63.2 (±11.
Station 3	428	70.8	7.6 (±20.1)	5.6 (±18.1)	-34.2 (±19.0)	34.4 (±16.1)	32.9 (±14.2)	32.9 (±14.1)	33.8 (±13.2)	33.2 (±15.
Station 4	526	82.6	8.7 (±14.8)	22.7 (±13.3)	-15.0 (±15.5)	49.0 (±14.3)	42.2 (±12.8)	37.0 (±12.3)	45.8 (±15.4)	38.2 (±13.
Station 5	172	66.0	48.1 (±11.4)	25.5 (±13.5)	21.5 (±14.4)	55.6 (±10.0)	52.3 (±10.3)	52.3 (±10.3)	44.7 (±11.5)	55.8 (±9.8
Station 6	341	94.5	74.4 (±11.2)	65.1 (±10.6)	69.7 (±11.2)	74.5 (±11.1)	72.1 (±10.9)	72.1 (±10.9)	58.3 (±11.4)	75.1 (±11.
4. By meteorological conditions, all stations (B-4)										
a. Wind Speed										
< 2.5 m/sec	591	76.0	33.4 (±12.7)	9.0 (±12.3)	13.1 (±13.3)	44.5 (±10.7)	38.8 (±10.0)	37.0 (±10.0)	20.2 (±10.9)	43.8 (±10.
2.5 to 5 m/sec	1533	81.5	34.7 (±8.8)	44.5 (±7.4)	12.1 (±9.4)	55.8 (±7.6)	52.5 (±6.9)	50.0 (±6.9)	56.1 (±6.7)	51.9 (±7.5
> 5 m/sec	401	90.5	28.7 (±17.1)	46.4 (±13.2)	2.2 (±18.4)	69.4 (±13.5)	66.7 (±13.0)	66.5 (±12.9)	85.5 (±12.4)	61.9 (±13.
b. Stability Group										
Class A & B	209	89.6	-12.1 (±31.3)	-16.4 (±29.6)	-24.2 (±33.4)	1.0 (±26.9)	3.0 (±21.9)	3.0 (±21.8)	-16.2 (±18.3)	3.3 (±26.
Class C	476	87.0	6.3 (±19.4)	2.3 (±16.2)	-9.4 (±21.2)	26.1 (±16.0)	19.4 (±13.6)	19.4 (±13.7)	11.6 (±12.4)	29.4 (±15.
Class D	1394	87.9	48.5 (±8.0)	49.7 (±6.7)	22.0 (±8.8)	74.5 (±6.6)	70.8 (±6.3)	70.1 (±6.3)	78.8 (±6.4)	69.6 (±6.7
Class E & F	446	52.7	36.6 (±9.4)	55.0 (±6.0)	11.5 (±11.8)	54.5 (±6.3)	53.3 (±6.4)	43.6 (±7.2)	56.9 (±6.4)	43.1 (±8.0

* Due to the effects of imposing a threshold cutoff value, the number of events and the average observed value differ slightly from model to model. The values listed are those for MPTER.

TABLE 7c. AVERAGE DIFFERENCE BETWEEN OBSERVED AND PREDICTED CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)
CLIFTY CREEK (1976) AVERAGING TIME: 24 HOURS

Data Sets	Number of Events*	Average Observed Value $\bar{C}_o$* ($\mu g/m^3$)	Difference of Averages ($\overline{C_o - C_p}$) For Each Model ($\mu g/m^3$)							
			MITER	MPSDM	COMPTER	SCSTER	3141	4141	TEM-8A	MULTIMAX
1. Highest concentration, event-by-event (A-1)	355	46.0	18.0 (±4.0)	20.3 (±3.7)	7.4 (±4.5)	29.2 (±3.9)	29.9 (±3.6)	29.2 (±3.5)	31.3 (±4.3)	27.9 (±3.7)
2. All concentrations, all stations (paired in time and location) (B-3)	1165	26.2	12.7 (±2.1)	13.4 (±1.8)	6.4 (±2.4)	18.5 (±1.9)	17.5 (±1.8)	17.0 (±1.8)	17.6 (±1.9)	17.6 (±1.9)
3. All concentrations, by station (B-1)										
Station 1	245	28.7	13.7 (±5.2)	17.4 (±4.6)	10.2 (±5.7)	20.6 (±4.8)	19.6 (±4.6)	18.5 (±4.4)	21.4 (±4.7)	19.3 (±4.9)
Station 2	233	26.3	16.8 (±3.8)	16.9 (±3.6)	11.6 (±4.0)	20.7 (±3.6)	19.7 (±3.5)	19.6 (±3.5)	19.5 (±3.5)	20.4 (±3.5)
Station 3	188	23.9	5.8 (±6.4)	5.4 (±5.2)	-7.6 (±7.0)	13.0 (±5.0)	13.0 (±4.6)	13.0 (±4.6)	13.8 (±4.4)	12.6 (±4.8)
Station 4	215	29.5	5.2 (±4.6)	9.5 (±4.4)	-2.8 (±5.0)	17.6 (±5.4)	15.4 (±4.8)	14.1 (±4.7)	16.6 (±6.1)	14.5 (±4.9)
Station 5	122	15.8	12.6 (±2.5)	8.7 (±2.6)	7.7 (±3.4)	14.0 (±2.3)	13.3 (±2.4)	13.3 (±2.4)	12.1 (±2.6)	14.0 (±2.3)
Station 6	162	28.3	23.3 (±3.9)	20.9 (±3.4)	22.0 (±3.8)	23.3 (±3.9)	22.6 (±3.8)	22.6 (±3.8)	19.1 (±3.8)	23.4 (±3.8)

* Due to the effects of imposing a threshold cutoff value, the number of events and the average observed value differ slightly from model to model. The values listed are those for MITER.

TABLE 8a. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES
CLIFTY CREEK (1975) AVERAGING TIME: 1 HOUR

Model	Highest observed value over all events and locations $C_o max$ ($\mu g/m^3$)	Highest predicted value over all events and locations $C_p max$ ($\mu g/m^3$)	Difference of maximum values $C_o - C_p$ ($\mu g/m^3$)	Average of maximum values observed at each station $\bar{C}_o$ ($\mu g/m^3$)	Average of maximum values predicted at each station $\bar{C}_p$ ($\mu g/m^3$)	Average difference $\overline{C_o - C_p}$ ($\mu g/m^3$)
MPTER (CRSTER, PLUME5)	1672.7	1492.5	180.2	994.5	1207.9	-213.4
MPSDM	1672.7	2940.0	-1267.3	994.5	1592.0	-597.5
COMPTER	1672.7	1529.0	143.7	994.5	1228.0	-233.5
SCSTER	1672.7	1374.4	298.2	994.5	1027.3	-32.8
3141	1672.7	727.8	944.9	994.5	591.3	403.2
4141	1672.7	727.8	944.9	994.5	591.3	403.2
TEM-8A	1672.7	1793.2	-120.5	994.5	1043.0	-48.5
MULTIMAX	1672.7	1383.7	289.0	994.5	1020.3	-25.8

TABLE 8b. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES
CLIFTY CREEK (1975) AVERAGING TIME: 3 HOUR

Model	Highest observed value over all events and locations $C_{O}max$ ($\mu g/m^3$)	Highest predicted value over all events and locations $C_{P}max$ ($\mu g/m^3$)	Difference of maximum values $C_O - C_P$ ($\mu g/m^3$)	Average of maximum values observed at each station $\bar{C}_O$ ($\mu g/m^3$)	Average of maximum values predicted at each station $\bar{C}_P$ ($\mu g/m^3$)	Average difference $\overline{C_O - C_P}$ ($\mu g/m^3$)
MPTER (CRSTER, PLUME5)	794.0	741.1	52.9	543.3	540.3	- 3.0
MPSUM	794.0	1560.9	-766.9	543.3	693.3	-150.0
COMPTER	794.0	760.9	33.1	543.3	602.3	-59.0
SCSTER	794.0	702.3	91.7	543.3	476.3	-67.0
3141	794.0	450.3	343.7	543.3	314.7	228.6
4141	794.0	450.3	343.7	543.3	314.7	228.6
TEM-8A	794.0	939.2	-145.2	543.3	508.3	35.0
MULTIMAX	794.0	692.6	101.4	543.3	465.5	77.8

TABLE 8c. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUN PREDICTED CONCENTRATION VALUES
CLIFTY CREEK (1975) AVERAGING TIME: 24 HOUR

Model	Highest observed value over all events and locations $C_o max$ ($\mu g/m^3$)	Highest predicted value over all events and locations $C_p max$ ($\mu g/m^3$)	Difference of maximum values $C_o - C_p$ ($\mu g/m^3$)	Average of maximum values observed at each station $\bar{C}_o$ ($\mu g/m^3$)	Average of maximum values predicted at each station $\bar{C}_p$ ($\mu g/m^3$)	Average difference $\overline{C_o - C_p}$ ($\mu g/m^3$)
MPTER (CRSTER, PLUME5)	209.5	171.1	38.4	151.8	135.5	16.3
MPSDM	209.5	195.2	14.3	151.8	130.1	21.7
COMPTER	209.5	241.6	-32.1	151.8	171.2	-19.4
SCSTER	209.5	106.6	102.9	151.8	83.1	68.7
3141	209.5	96.8	112.7	151.8	74.6	77.2
4141	209.5	96.8	112.7	151.8	74.6	77.2
TEM-8A	209.5	142.1	67.3	151.8	92.4	59.4
MULTIMAX	209.5	104.9	104.6	151.8	85.7	66.1

TABLE 9a. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES
CLIFTY CREEK (1976) AVERAGING TIME: 1 HOUR

Model	Highest observed value over all events and locations $C_{o}max$ ($\mu g/m^3$)	Highest predicted value over all events and locations $C_{p}max$ ($\mu g/m^3$)	Difference of maximum values $C_{o} - C_{p}$ ($\mu g/m^3$)	Average of maximum values observed at each station $\bar{C}_{o}$ ($\mu g/m^3$)	Average of maximum values predicted at each station $\bar{C}_{p}$ ($\mu g/m^3$)	Average difference $\overline{C_{o} - C_{p}}$ ($\mu g/m^3$)
MPTER (CRSTEM, PLUME5)	950.8	1422.4	-471.6	858.1	1118.1	-260.0
MPSIM	950.8	1512.1	-561.3	858.1	1152.9	-294.8
COMPTER	950.8	1438.8	-488.0	858.1	1160.3	-302.2
SCSTER	950.8	1422.2	-471.4	858.1	1023.3	-165.2
3141	950.8	841.3	109.5	858.1	626.2	231.9
4141	950.8	841.3	109.5	858.1	626.2	231.9
TEM-8A	950.8	1309.9	-359.1	858.1	953.0	94.9
MULTIMAX	950.8	1398.7	-447.9	858.1	1025.9	-167.8

TABLE 9b. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES
CLIFTY CREEK (1976) AVERAGING TIME: 3 HOUR

Model	Highest observed value over all events and locations $C_{o}max$ ($\mu g/m^3$)	Highest predicted value over all events and locations $C_{p}max$ ($\mu g/m^3$)	Difference of maximum values $C_o - C_p$ ($\mu g/m^3$)	Average of maximum values observed at each station $\bar{C}_o$ ($\mu g/m^3$)	Average of maximum values predicted at each station $\bar{C}_p$ ($\mu g/m^3$)	Average difference $\overline{C_o - C_p}$ ($\mu g/m^3$)
MPTER (CRSTER, PLUME5)	623.7	856.0	-232.3	525.6	579.5	-53.9
MPSIM	623.7	947.1	-323.4	525.6	562.0	-36.4
COMPTER	623.7	1008.4	-384.7	525.6	660.4	-140.8
SCSTER	623.7	657.0	-33.3	525.6	488.2	37.4
3141	623.7	453.4	170.3	525.6	324.1	201.5
4141	623.7	453.4	170.3	525.6	324.1	201.5
TEM-8A	623.7	763.7	-140.1	525.6	443.0	82.6
MULTIMAX	623.7	616.0	7.6	525.6	463.2	62.4

TABLE 9c. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES
CLIFTY CREEK (1976) AVERAGING TIME: 24 HOUR

Model	Highest observed value over all events and locations $C_o max$ ($\mu g/m^3$)	Highest predicted value over all events and locations $C_p max$ ($\mu g/m^3$)	Difference of maximum values $C_o - C_p$ ($\mu g/m^3$)	Average of maximum values observed at each station $\overline{C_o}$ ($\mu g/m^3$)	Average of maximum values predicted at each station $\overline{C_p}$ ($\mu g/m^3$)	Average difference $\overline{C_o - C_p}$ ($\mu g/m^3$)
MPTER (CRSTER, PLUME5)	181.2	248.7	-67.5	132.8	133.3	-0.5
MPSDM	181.2	178.7	2.5	132.8	107.1	25.7
COMPTER	181.2	274.9	-93.7	132.8	159.6	-26.8
SCSTER	181.2	203.8	-22.5	132.8	100.1	32.7
3141	181.2	129.1	52.2	132.8	74.3	58.5
4141	181.2	129.1	52.1	132.8	75.5	57.3
TEM-8A	181.2	102.2	79.0	132.8	74.8	58.0
MULTIMAX	181.2	196.0	-14.8	132.8	99.2	33.6

SECTION 6

CONCLUSIONS AND RECOMMENDATIONS

The primary purpose of this work assignment is to provide model evaluation statistics for selected rural models. TRC has been careful to present the model performance results, and information describing how these results were obtained, without drawing inferences or making judgements concerning the performance of any individual model or of the models as a group. The general performance characteristics of the entire group of models have been discussed in Section 5. The implications of this general performance, or the relative performance of any specific model, for regulatory applications are not discussed here. The conclusions and recommendations from this work assignment are confined to procedural issues and model evaluation methods, rather than the performance of rural dispersion models.

One conclusion is apparent from even a cursory inspection of the appendix tables. The volume of model performance statistics which was generated in this study is excessive. The amount of effort required to analyze fully the information contained in these tables is prohibitive. After a limited review, it is also apparent that many of the statistics are relatively uninformative, repetitious, and redundant. It is not very productive to demonstrate, eight times over, many of the general performance characteristics noted in Section 5. In an effort to follow the AMS workshop recommendations as closely as possible, TRC and EPA elected to implement the full list of performance measures for all the data sets and subsets specified. A

thorough review of this final report is warranted, with the goal of setting priorities and evaluating the usefulness of various measures, in order to provide greater flexibility and better focus for future model evaluation exercises. With that objective in mind, it would be valuable to obtain the reactions of workshop participants at Woods Hole to this report.

A related item concerns the display of model performance results. The current statistical system (SPSS) is relatively inflexible for data presentation. Considerable improvement could be made in the tables of evaluation statistics by redefining several performance measures to facilitate comparisons and to make the results more comprehensible to the technical community. The objective of implementing literally the workshop recommendations led to the relatively unimaginative data formats. Greater attention should be devoted to planning for data display, including graphics, when future model evaluation exercises are undertaken.

Several specific technical issues relating to rural model evaluation require further attention. Two practical issues involve the definition (or estimation) of background concentration levels and the application of threshold cutoff values. The method selected for estimating background concentrations may have a significant effect upon model evaluation statistics. For a data set such as that from Clifty Creek, it is necessary to account for background since sources other than the Clifty Creek plant can significantly impact the monitoring stations. The AMS workshop report provides no clear guidance concerning adjustment of measured concentration for background. The method selected for this study has two virtues: it is simple to implement and it derives from regulatory guidance. However, the accuracy of the method has not been established.

The use of threshold cutoff values to eliminate the large number of near-zero observed and predicted concentration values from a model evaluation data base has strong practical justification. Unfortunately, it may also have some unforeseen consequences, particularly for statistics which are supposed to represent "all concentration values." The effects of using a threshold cutoff on correlation coefficients, frequency distribution comparisons, and measures of serial correlation are difficult to judge in the absence of some experimentation.

TRC recommends an investigation of the effects on model performance statistics of using different methods for estimating background concentrations and different threshold cutoff values (or no threshold).

As a final conclusion, TRC wishes to emphasize the importance of quality control and error-checking procedures to the successful implementation of a comparative model evaluation. This work assignment required the modification of eight air quality models developed by eight separate organizations. The quality and thoroughness of model documentation varied considerably, and the modifications were specific to each model. It is very difficult (but very important) to avoid inadvertent changes to a model's computation scheme when significant input/output modifications are introduced. TRC employed verification procedures which served as a simple check against inadvertent model changes. Similarly, TRC checked the analysis system at various points to confirm that background adjustments, averaging, screening for thresholds, and data sorting and ranking were implemented properly. In future studies of this kind, more explicit and more formal quality control measures should be considered to ensure that the models and the analysis system are operating as intended.

REFERENCES

1. Fox, D. G., 1981. Judging Air Quality Model Performance (A Summary of the AMS Workshop on Dispersion Model Performance, Woods Hole, Mass., 8-11 September 1980). Bull. Am. Meteorol. Soc., 62, 599-609.

2. Mills, M.T., 1979. Data Base for the Evaluation of Short Range Dispersion Models. R-001-EPA-79, Teknekron, Inc., Berkeley, CA.

3. Nickola, P. W., 1977. The Hanford 67-Series: A Volume of Atmospheric Field Diffusion Measurements. PNL-2433, UC-11, Battelle Pacific Northwest Laboratories, Richland, WA.

4. United States Environmental Protection Agency, 1977. User's Manual for Single Source (CRSTER) Model. EPA-450/2-77-013, Monitoring and Data Analysis Division, Research Triangle Park, NC.

5. Snedecor, G. W. and W. G. Cochran, 1967. Statistical Methods, 6th Edition. Iowa State University Press, Ames, Iowa.

6. Hollander, M. and R. A. Wolfe, 1973. Nonparametric Statistical Methods. John Wiley and Sons, New York, NY.

7. Hirtzel, C. S. and J. E. Quon, 1981. Estimating Precision of Autocorrelated Air Quality Measurements. Summary of Proceedings Environmetrics 81, 200-201.

8. Wackter, D.J. and D.M. Bonitata, 1982. Description of Archive Structure to Accommodate Data Bases Appropriate for Model Evaluations. EPA-68-02-354-WA4, TRC 1671-R80, TRC Environmental Consultants, Inc., E. Hartford, CT.

9. United States Environmental Protection Agency, 1978. Guideline on Air Quality Models. EPA-450/2-78-027, OAQPS, Research Triangle Park, NC.

10. SPSS, 1975. Statistical Package for the Social Sciences, Second Edition. N. H. Nie, ed. McGraw-Hill Book Company, New York, NY.

11. SPSS, 1981. SPSS Update 7-9: New Procedures and Facilities for Releases 7-9. C. H. Hull and N. H. Nie, series editors. McGraw-Hill Book Company, New York, NY.

APPENDIX A

Statistics for 25 Highest Values

Appendix A: Statistics for 25 Highest Values

In the tables which follow, model performance statistics are presented which compare the 25 highest observed and 25 highest predicted concentration values, unpaired in time or location. Each table contains the results for one model, one calendar year of Clifty Creek data (1975 or 1976) and one averaging time (1, 3, or 24 hours). In each table, results are presented for the entire data set (all stations/all events) and for subsets representing either a single monitoring station or particular meteorological conditions. Subsets based on meteorology were employed only for 1-hour and 3-hour averaging times. The wind speed or stability value used to classify a 3-hour period was the median of the three hourly values. In an effort to mitigate statistical problems due to temporal or spatial correlation, selection rules stipulated that only one value could be selected from a given event, and that two consecutive values from the same station could not be used. The statistical properties of samples selected in this manner are not known; hopefully, potentially negative consequences are minimal since these selection rules generally eliminated only about 20 percent of the highest values.

The first two columns of results in Table A are simply the average of the 25 highest observed values and the average of the 25 highest predicted values for each data set. The first performance measure (third column) is the difference between these averages. A positive value implies model underprediction. In parentheses following the calculated value is the 95 percent confidence interval, determined by using the two-sample Student's t test.

The second performance measure is the difference between the medians (13th highest values) of the observed and predicted 25 highest values. The

95 percent confidence interval (in parentheses) is determined using the non-parametric Mann-Whitney test.

The third performance measure is the variance comparison. The variance of the 25 highest observed values was divided by the variance of the predicted values. The variance ratio is presented, together with the 95 percent confidence interval (in parentheses) determined using an F test.

The final performance measure in Table A is the frequency distribution comparison. The cumulative distribution function f(C) represents the fraction of the data set (in this case, the fraction of 25 data points) with concentration values less than or equal to C. The value presented in this column is the largest difference between the observed and predicted distribution functions (for the same concentration value) obtained when the two functions are compared for all concentration values.

A positive fractional difference implies model overprediction. At the concentration value where the maximum difference occurs, the fraction of observed values less than or equal to that concentration value is larger than the fraction of predicted values. Conversely, the fraction of observed values higher than that concentration value is smaller than the fraction of predicted values.

The value given in parentheses is the maximum difference which is significantly different from zero, at a 95 percent confidence level, as given by the Kolmogorov-Smirnov (K-S) test. This confidence interval is a function of the number of cases. The value is, therefore, the same (.385) for all data sets in Table A, since the number of cases is always 25.

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: RPTER AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A=4A)	790.6	1077.7	-286.9 (-403.1, -170.7)	-313.1 (-374.8, -251.6)	2.12 (1.07, 4.21)	0.84 (.385)
2. BY STATION/ALL EVENTS (A=4B)						
STATION 1	508.9	595.0	-86.1 (-146.5, -25.7)	-70.9 (-117.1, -29.7)	0.65 (0.33, 1.28)	0.48 (.385)
STATION 2	535.0	845.0	-310.0 (-397.5, -222.5)	-271.3 (-353.8, -220.8)	0.33 (0.17, 0.65)	0.76 (.385)
STATION 3	580.1	935.1	-355.0 (-480.2, -229.8)	-386.7 (-468.9, -298.7)	2.41 (1.22, 4.78)	0.84 (.385)
STATION 4	550.0	667.8	-117.8 (-193.4, -42.2)	-86.3 (-172.9, -38.9)	0.89 (0.45, 1.78)	0.52 (.385)
STATION 5	225.9	315.3	-89.4 (-251.5, 72.7)	81.6 (-96.7, 124.4)	0.05 (0.02, 0.09)	-0.56 (.385)
STATION 6	512.6	451.6	60.8 (-56.2, 177.8)	45.6 (-36.4, 118.8)	1.75 (0.88, 3.46)	-0.32 (.385)
3. BY METEOROLOGICAL CONDITION (A=5)						
A. WIND SPEED						
<2.5 M/SEC	652.5	862.7	-210.2 (-303.4, -117.0)	-239.1 (-292.9, -163.9)	1.98 (1.00, 3.94)	0.76 (.385)
2.5 TO 5 M/SEC	652.0	1021.3	-369.3 (-492.2, -246.4)	-403.5 (-455.3, -305.3)	1.49 (0.75, 2.96)	0.88 (.385)
>5 M/SEC	489.9	557.9	-68.0 (-130.9, -5.1)	-105.6 (-139.1, -22.4)	2.20 (1.11, 4.37)	0.48 (.385)
B. STABILITY GROUP						
CLASS A & B	481.3	963.0	-481.7 (-574.7, -388.7)	-436.4 (-527.3, -389.2)	0.37 (0.18, 0.73)	0.96 (.385)
CLASS C	678.9	926.8	-247.9 (-367.0, -128.8)	-317.4 (-360.2, -197.6)	2.27 (1.14, 4.50)	0.76 (.385)
CLASS D	586.6	558.5	28.1 (-19.0, 75.2)	4.6 (-19.4, 72.5)	0.84 (0.42, 1.66)	-0.36 (.385)
CLASS E & F	398.0	341.8	56.2 (-49.2, 161.6)	-7.1 (-56.5, 41.8)	12.48 (6.29, 24.75)	0.40 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: RPTEM AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	476.3	520.0	-43.7 (-99.5, 12.1)	-56.7 (-93.2, 2.6)	1.19 (0.60, 2.36)	0.28 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	322.6	310.4	12.2 (-27.4, 51.8)	4.4 (-31.2, 43.0)	1.36 (0.69, 2.70)	-0.16 (.385)
STATION 2	286.6	393.2	-106.6 (-174.1, -39.1)	-103.8 (-141.3, -31.0)	0.34 (0.17, 0.67)	0.48 (.385)
STATION 3	315.9	403.4	-87.5 (-159.3, -15.7)	-118.2 (-151.4, -60.1)	2.14 (1.08, 4.24)	0.60 (.385)
STATION 4	313.3	331.0	-17.7 (-70.7, 35.3)	-14.8 (-52.6, 26.3)	0.97 (0.49, 1.93)	0.28 (.385)
STATION 5	125.6	99.9	25.7 (-40.2, 91.6)	82.9 (45.3, 100.6)	0.08 (0.04, 0.17)	-0.64 (.385)
STATION 6	257.9	163.2	94.7 (33.2, 156.2)	51.4 (16.2, 130.0)	1.89 (0.95, 3.74)	-0.52 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	316.2	344.7	-28.5 (-97.4, 40.4)	-5.5 (-63.0, 32.3)	0.52 (0.26, 1.04)	-0.28 (.385)
2.5 TO 5 M/SEC	410.5	474.1	-63.6 (-121.3, -5.9)	-51.1 (-111.7, -19.5)	1.20 (0.60, 2.38)	0.44 (.385)
>5 M/SEC	308.1	316.9	-8.8 (-65.0, 47.4)	-60.1 (-75.1, 16.3)	2.54 (1.28, 5.04)	0.32 (.385)
B. STABILITY GROUP						
CLASS A & B	228.3	411.7	-183.4 (-255.0, -111.8)	-201.7 (-251.8, -129.6)	1.09 (0.55, 2.17)	0.80 (.385)
CLASS C	359.0	441.1	-82.1 (-147.3, -16.9)	-72.6 (-126.1, -40.1)	1.21 (0.61, 2.41)	0.60 (.385)
CLASS D	385.5	348.3	37.2 (-3.6, 78.0)	22.6 (-7.7, 64.6)	3.00 (1.51, 5.95)	-0.28 (.385)
CLASS E & F	196.9	152.2	44.7 (-10.6, 100.0)	36.9 (1.0, 58.3)	2.37 (1.20, 4.71)	-0.40 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MPTER AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias — Difference of Averages $\bar{C}_O - \bar{C}_p$ ($\mu g/m^3$)	Performance Measures: Bias — Difference of Medians $M_O - M_p$ ($\mu g/m^3$)	Performance Measures: Variance Comparison S_O^2/S_p^2	Performance Measures: Frequency Distribution Comparison $[f(C_O) - f(C_p)]$ max (fraction)
1. All stations/all events (A - 4a)	126.7	118.4	8.3 ($\pm$16.9)	5.1 (-10.4, 20.6)	1.55 (0.78, 3.08)	-0.20 (.385)
2. By station/all events (A - 4b)						
Station 1	97.4	61.7	35.6 ($\pm$17.6)	39.4 (23.5, 46.3)	1.28 (0.64, 2.53)	-0.72 (.385)
Station 2	65.4	68.0	-2.6 ($\pm$17.6)	-0.2 (-13.5, 11.7)	0.72 (0.36, 1.43)	-0.24 (.385)
Station 3	78.1	75.1	3.0 ($\pm$19.9)	0.7 (-12.7, 13.5)	1.62 (0.81, 3.21)	-0.20 (.385)
Station 4	84.5	78.8	5.7 ($\pm$15.4)	21.4 (-0.6, 27.7)	0.32 (0.16, 0.63)	-0.40 (.385)
Station 5	34.9	15.8	19.1 ($\pm$11.2)	26.8 (21.6, 29.4)	0.15 (0.08, 0.30)	-0.84 (.385)
Station 6	57.5	28.4	29.1 ($\pm$14.7)	19.6 (14.6, 35.3)	2.06 (1.04, 4.09)	-0.72 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: MPTER AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-9A)	771.8	1084.8	-313.0 (-369.3, -256.7)	-326.7 (-366.8, -256.1)	0.60 (0.30, 1.20)	0.96 (.385)
2. BY STATION/ALL EVENTS (A-9B)						
STATION 1	581.7	563.0	18.7 (-41.6, 79.0)	14.9 (-23.0, 67.4)	0.87 (0.44, 1.72)	-0.28 (.385)
STATION 2	658.9	781.9	-123.0 (-201.0, -45.0)	-119.5 (-197.8, -29.1)	1.24 (0.62, 2.46)	0.44 (.385)
STATION 3	450.2	1028.7	-578.5 (-643.0, -514.0)	-620.6 (-678.0, -506.9)	0.75 (0.38, 1.48)	0.96 (.385)
STATION 4	546.7	690.3	-143.6 (-211.8, -75.4)	-76.7 (-195.7, -61.6)	0.44 (0.22, 0.87)	0.56 (.385)
STATION 5	321.3	293.2	28.1 (-124.5, 180.7)	78.7 (23.3, 179.2)	0.22 (0.11, 0.45)	-0.56 (.385)
STATION 6	496.8	532.5	-35.7 (-113.9, 42.5)	-39.1 (-82.2, 89.2)	0.33 (0.17, 0.66)	-0.24 (.385)
3. BY METEOROLOGICAL CONDITION (A-9)						
A. WIND SPEED						
<2.5 M/SEC	669.0	953.5	-284.5 (-365.9, -203.1)	-243.2 (-347.2, -198.3)	0.78 (0.39, 1.55)	0.80 (.385)
2.5 TO 5 M/SEC	667.5	952.3	-284.8 (-350.3, -219.3)	-276.4 (-336.8, -225.3)	0.68 (0.34, 1.34)	0.84 (.385)
>5 M/SEC	458.5	600.4	-141.9 (-237.5, -46.3)	-126.8 (-152.1, -82.7)	0.36 (0.18, 0.71)	0.76 (.385)
B. STABILITY GROUP						
CLASS A & B	541.4	1003.4	-462.0 (-548.2, -375.8)	-493.5 (-562.3, -378.2)	0.78 (0.38, 1.48)	0.92 (.385)
CLASS C	631.4	939.4	-308.0 (-381.7, -234.3)	-330.9 (-385.5, -244.8)	1.83 (0.92, 3.62)	0.80 (.385)
CLASS D	672.4	517.5	154.9 (113.9, 195.9)	158.9 (102.5, 177.6)	5.22 (2.63, 10.36)	-0.84 (.385)
CLASS E & F	343.5	371.9	-28.4 (-80.9, 24.1)	-37.0 (-75.8, 9.2)	1.09 (0.55, 2.15)	0.28 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: MPTER AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	480.9	535.1	-54.2 (-105.4, -3.0)	-63.8 (-84.4, -0.3)	0.59 (0.27, 1.07)	0.36 (.385
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	372.7	323.2	49.5 (2.4, 96.6)	51.9 (5.1, 89.5)	0.78 (0.39, 1.54)	-0.48 (.385
STATION 2	373.6	317.5	56.1 (1.5, 110.7)	75.4 (10.0, 102.7)	0.87 (0.44, 1.72)	-0.40 (.385
STATION 3	252.8	444.3	-191.5 (-261.9, -121.1)	-169.2 (-240.2, -105.3)	0.27 (0.14, 0.55)	0.84 (.385
STATION 4	360.2	336.2	24.0 (-32.0, 80.0)	8.6 (-140.6, 46.6)	1.24 (0.63, 2.46)	-0.24 (.385
STATION 5	177.1	114.6	62.5 (-10.2, 135.2)	89.1 (51.0, 126.6)	0.33 (0.16, 0.65)	-0.68 (.385
STATION 6	287.8	209.8	78.0 (29.1, 126.9)	107.9 (40.6, 142.8)	0.24 (0.12, 0.47)	-0.60 (.385
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	338.6	377.1	-38.5 (-87.9, 10.9)	-15.4 (-88.2, 8.8)	0.58 (0.29, 1.15)	0.28 (.385
2.5 TO 5 M/SEC	445.5	507.1	-61.6 (-120.5, -2.7)	-109.7 (-112.3, 8.8)	0.40 (0.20, 0.79)	0.36 (.385
>5 M/SEC	316.0	310.0	6.0 (-46.0, 58.0)	2.7 (-42.3, 39.7)	1.60 (0.80, 3.17)	0.28 (.385
B. STABILITY GROUP						
CLASS A & B	263.8	426.8	-163.0 (-225.0, -101.0)	-154.1 (-210.0, -99.8)	0.43 (0.21, 0.84)	0.60 (.385
CLASS C	364.3	453.7	-89.4 (-151.1, -27.7)	-65.4 (-138.5, -28.5)	0.64 (0.32, 1.27)	0.48 (.385
CLASS D	443.1	336.0	107.1 (69.0, 145.2)	108.1 (74.2, 132.2)	1.66 (0.84, 3.30)	-0.68 (.385
CLASS E & F	217.9	170.8	47.1 (-4.8, 99.0)	64.4 (24.0, 87.5)	0.73 (0.37, 1.44)	-0.52 (.385

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: MPTER AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias — Difference of Averages $\bar{C}_O - \bar{C}_p$ ($\mu g/m^3$)	Performance Measures: Bias — Difference of Medians $M_O - M_p$ ($\mu g/m^3$)	Performance Measures: Variance Comparison S_O^2/S_p^2	Performance Measures: Frequency Distribution Comparison $\lvert f(C_O) - f(C_p) \rvert$ max (fraction)
1. All stations/all events (A - 4a)	125.3	126.7	-1.4 ($\pm$9.1)	5.6 (-7.6, 13.5)	2.99 (1.51, 5.92)	0.20 (.385)
2. By station/all events (A - 4b)						
Station 1	96.4	75.6	20.8 ($\pm$14.2)	28.9 (12.6, 37.1)	0.42 (0.21, 0.83)	0.64 (.385)
Station 2	84.8	57.4	27.4 ($\pm$12.1)	25.1 (17.9, 39.4)	0.60 (0.30, 1.19)	0.64 (.385)
Station 3	64.3	92.1	-27.8 ($\pm$21.3)	-32.8 (-38.1, -3.5)	0.30 (0.15, 0.59)	0.52 (.385)
Station 4	107.7	91.8	15.8 ($\pm$15.4)	20.2 (4.0, 29.0)	1.08 (0.55, 2.14)	0.44 (.385)
Station 5	40.1	15.7	24.4 ($\pm$11.8)	28.3 (19.9, 32.4)	0.67 (0.34, 1.33)	0.80 (.385)
Station 6	71.8	28.0	43.8 ($\pm$10.0)	47.8 (34.4, 53.5)	1.55 (0.78, 3.07)	0.84 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED
SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	790.8	1214.4	-423.6 (-643.5, -203.7)	-337.4 (-431.2, -211.9)	0.24 (0.12, 0.47)	0.84 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	508.9	516.0	-7.1 (-75.7, 61.5)	12.0 (-37.4, 58.4)	0.44 (0.22, 0.87)	-0.24 (.385)
STATION 2	535.0	735.2	-200.2 (-309.7, -90.7)	-137.4 (-202.1, -94.6)	0.19 (0.09, 0.37)	0.64 (.385)
STATION 3	580.0	991.0	-411.0 (-597.5, -224.5)	-342.5 (-463.9, -243.0)	0.47 (0.24, 0.93)	0.72 (.385)
STATION 4	550.0	588.0	-38.0 (-128.6, 52.6)	-8.6 (-96.0, 60.3)	0.49 (0.25, 0.97)	0.16 (.385)
STATION 5	225.9	563.6	-337.7 (-566.1, -109.3)	-208.0 (-351.7, -88.9)	0.02 (0.01, 0.04)	0.64 (.385)
STATION 6	512.6	468.6	44.0 (-67.9, 155.9)	-3.8 (-58.0, 86.5)	2.27 (1.15, 4.51)	-0.24 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	653.5	1170.6	-517.1 (-737.5, -296.7)	-329.2 (-493.8, -288.5)	0.14 (0.07, 0.27)	0.92 (.385)
2.5 TO 5 M/SEC	652.0	770.0	-118.0 (-232.6, -3.4)	-96.3 (-191.1, -83.6)	2.21 (1.11, 4.39)	0.64 (.385)
>5 M/SEC	489.9	322.9	167.0 (111.8, 222.2)	123.9 (84.1, 192.6)	12.84 (6.47, 25.48)	-0.76 (.385)
B. STABILITY GROUP						
CLASS A & B	481.3	1033.7	-552.4 (-767.9, -336.9)	-393.7 (-489.0, -332.1)	0.05 (0.03, 0.11)	0.92 (.385)
CLASS C	678.9	1014.7	-335.8 (-500.0, -171.6)	-310.3 (-407.2, -179.6)	0.58 (0.29, 1.14)	0.64 (.385)
CLASS D	586.6	342.7	243.9 (209.1, 278.7)	220.1 (197.8, 272.1)	5.41 (2.73, 10.73)	-1.00 (.385)
CLASS E & F	398.0	36.2	361.8 (257.8, 465.8)	300.4 (242.3, 340.5)	21.11 (10.64, 41.88)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	476.3	559.6	-83.3 (-191.3, 24.7)	-33.1 (-84.0, 13.6)	0.17 (0.09, 0.34)	0.20 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	322.6	243.8	78.8 (41.8, 115.8)	66.3 (45.3, 99.5)	1.94 (0.98, 3.84)	-0.64 (.385)
STATION 2	286.6	300.9	-14.3 (-63.3, 34.7)	-17.1 (-45.1, 20.1)	0.90 (0.46, 1.79)	-0.80 (.385)
STATION 3	315.9	471.9	-156.0 (-244.0, -68.0)	-167.0 (-208.6, -92.6)	0.83 (0.42, 1.65)	0.60 (.385)
STATION 4	313.3	261.6	51.7 (3.4, 100.0)	54.2 (8.5, 89.1)	1.46 (0.74, 2.90)	-0.36 (.385)
STATION 5	125.6	234.3	-108.7 (-233.4, 16.0)	-62.9 (-114.7, 16.7)	0.02 (0.01, 0.04)	0.40 (.385)
STATION 6	257.9	187.0	70.9 (13.7, 128.1)	43.2 (15.1, 83.2)	3.24 (1.63, 6.43)	-0.44 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	316.2	497.9	-181.7 (-300.8, -62.6)	-129.5 (-189.8, -55.9)	0.13 (0.07, 0.26)	0.56 (.385)
2.5 TO 5 M/SEC	410.5	397.9	12.6 (-40.9, 66.1)	26.9 (-33.1, 49.5)	1.73 (0.87, 3.43)	-0.16 (.385)
>5 M/SEC	308.1	194.2	113.9 (62.8, 165.1)	64.8 (49.4, 123.8)	7.14 (3.60, 14.16)	-0.64 (.385)
B. STABILITY GROUP						
CLASS A & B	228.3	363.2	-134.9 (-198.1, -71.7)	-145.8 (-197.5, -96.8)	2.05 (1.03, 4.06)	0.80 (.385)
CLASS C	359.0	511.2	-152.2 (-271.8, -32.6)	-99.6 (-158.2, -37.9)	0.20 (0.10, 0.39)	0.56 (.385)
CLASS D	385.5	253.7	131.8 (89.2, 174.4)	127.8 (88.5, 164.6)	2.12 (1.07, 4.20)	-0.84 (.385)
CLASS E & F	196.9	32.8	164.1 (115.6, 212.6)	130.7 (104.1, 156.8)	21.62 (10.90, 42.90)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_P ($\mu g/m^3$)	Performance Measures: Bias — Difference of Averages $C_O - C_P$ ($\mu g/m^3$)	Performance Measures: Bias — Difference of Medians $M_O - M_P$ ($\mu g/m^3$)	Performance Measures: Variance Comparison S_O^2/S_P^2	Performance Measures: Frequency Distribution Comparison $[f(C_O) - f(C_P)]$ max (fraction)
1. All stations/all events (A - 4a)	126.7	108.3	18.0 (±18.6)	23.2 (6.9, 31.8)	1.02 (.51, 2.03)	-.52 (.385)
2. By station/all events (A - 4b)						
Station 1	97.4	48.3	49.1 (±15.1)	47.7 (33.5, 55.4)	3.26 (1.64, 6.46)	-.84 (.385)
Station 2	65.4	56.5	8.9 (±15 0)	8.3 (-0.6, 16.4)	1.39 (.70, 2.76)	-.32 (.385)
Station 3	78.1	87.4	-9.3 (±20.9)	-13.9 (-23.7, 1.4)	1.30 (.65, 2.57)	.36 (.385)
Station 4	84.5	59.6	24.9 (±11.4)	34.4 (16.0, 40.6)	.79 (.40, 1.56)	-.64 (.385)
Station 5	34.9	33.4	1.5 (±17.1)	6.3 (1.2, 19.7)	.06 (.03, .12)	-.48 (.385)
Station 6	57.5	32.2	25.3 (±13.8)	18.6 (1.2, 27.3)	3.56 (1.79, 7.06)	-.68 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	771.8	1005.0	-233.2 (-326.2, -140.2)	-139.7 (-304.7, -112.0)	0.16 (0.08, 0.32)	0.68 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	581.7	558.6	23.1 (-84.6, 130.8)	115.0 (15.7, 146.4)	0.17 (0.09, 0.34)	-0.56 (.385)
STATION 2	658.9	646.5	12.4 (-57.9, 82.7)	28.3 (-68.9, 91.0)	2.14 (1.08, 4.24)	-0.24 (.385)
STATION 3	450.2	860.9	-410.7 (-507.2, -314.2)	-359.3 (-407.0, -325.3)	0.24 (0.12, 0.47)	0.96 (.385)
STATION 4	546.7	628.9	-82.2 (-167.0, 2.6)	-28.9 (-135.3, 19.5)	0.25 (0.13, 0.49)	0.28 (.385)
STATION 5	321.3	608.9	-287.6 (-423.5, -151.7)	-338.9 (-435.1, -105.3)	0.30 (0.15, 0.60)	0.52 (.385)
STATION 6	496.8	504.3	-7.5 (-70.1, 55.1)	-4.0 (-35.3, 43.2)	0.62 (0.31, 1.24)	-0.16 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	668.9	1000.6	-331.7 (-435.3, -228.1)	-247.7 (-396.8, -209.2)	0.38 (0.19, 0.75)	0.76 (.385)
2.5 TO 5 M/SEC	667.5	691.9	-24.4 (-79.7, 30.9)	-45.8 (-89.9, 23.7)	1.30 (0.66, 2.58)	0.24 (.385)
>5 M/SEC	458.5	320.9	137.6 (86.3, 188.9)	89.9 (73.0, 128.7)	15.38 (7.75, 30.51)	-0.92 (.385)
B. STABILITY GROUP						
CLASS A & B	541.4	870.7	-329.3 (-426.9, -231.7)	-288.5 (-353.7, -256.1)	0.50 (0.25, 0.99)	0.68 (.385)
CLASS C	631.4	892.9	-261.5 (-360.4, -162.6)	-230.3 (-311.8, -166.8)	0.56 (0.28, 1.11)	0.76 (.385)
CLASS D	672.4	365.5	306.9 (251.1, 362.7)	322.9 (273.7, 341.3)	0.81 (0.41, 1.62)	-0.92 (.385)
CLASS E & F	343.5	19.9	323.6 (281.6, 365.6)	299.8 (281.7, 327.3)	4.56 (2.30, 9.05)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTIC COMPARISON (FOBS-FPRED (FRACTION)
1. ALL STATIONS/ALL EVENTS (A=4A)	480.9	526.3	-45.4 (-103.6, 12.8)	-48.1 (-75.4, 13.7)	0.38 (0.19, 0.75)	0.28 (.385
2. BY STATION/ALL EVENTS (A=4B)						
STATION 1	372.7	259.6	113.1 (71.9, 154.3)	109.5 (79.1, 142.6)	1.33 (0.67, 2.64)	-0.76 (.385)
STATION 2	373.6	276.3	97.3 (47.0, 147.6)	126.6 (53.2, 145.3)	1.21 (0.61, 2.41)	-0.64 (.385)
STATION 3	252.8	462.6	-209.8 (-283.0, -136.6)	-207.3 (-269.4, -128.1)	0.25 (0.13, 0.50)	0.80 (.385)
STATION 4	360.2	310.8	49.4 (-15.0, 113.8)	29.2 (10.8, 88.6)	0.72 (0.36, 1.43)	-0.48 (.385)
STATION 5	177.1	232.9	-55.8 (-119.0, 7.4)	-77.1 (-1[illegible], 18.5)	0.47 (0.24, 0.94)	0.32 (.385)
STATION 6	287.8	197.8	90.0 (56.2, 123.8)	106.4 (62.5, 124.9)	0.65 (0.33, 1.28)	-0.64 (.385)
3. BY METEOROLOGICAL CONDITION (A=5)						
A. WIND SPEED						
<2.5 M/SEC	338.6	458.9	-120.3 (-182.8, -57.8)	-59.2 (-136.5, -57.8)	0.30 (0.15, 0.60)	0.56 (.385)
2.5 TO 5 M/SEC	445.5	419.9	25.6 (-29.8, 81.0)	3.7 (-18.5, 80.7)	0.48 (0.24, 0.94)	-0.40 (.385)
>5 M/SEC	316.0	186.6	129.4 (84.4, 174.4)	116.0 (80.7, 135.2)	4.86 (2.45, 9.65)	-0.84 (.385)
B. STABILITY GROUP						
CLASS A & B	263.8	429.5	-165.7 (-238.7, -92.7)	-165.1 (-214.8, -83.3)	0.28 (0.14, 0.55)	0.60 (.385)
CLASS C	364.3	437.4	-73.1 (-128.5, -17.7)	-55.7 (-122.1, -24.7)	0.94 (0.47, 1.86)	0.48 (.385)
CLASS D	443.1	255.2	187.9 (153.9, 221.9)	171.6 (146.9, 203.5)	3.77 (1.90, 7.49)	-0.96 (.385)
CLASS E & F	217.9	32.1	185.8 (149.0, 222.6)	182.4 (143.6, 201.5)	5.43 (2.74, 10.78)	-0.96 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: HPSDM AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias — Difference of Averages $\bar{C}_O - \bar{C}_p$ ($\mu g/m^3$)	Performance Measures: Bias — Difference of Medians $M_O - M_p$ ($\mu g/m^3$)	Performance Measures: Variance Comparison S_O^2/S_p^2	Performance Measures: Frequency Distribution Comparison $[f(C_O) - f(C_p)]$ max (fraction)
1. All stations/all events (A - 4a)	125.3	102.1	23.3 (±13.2)	22.5 (16.5, 36.1)	0.59 (0.30, 1.18)	-0.72 (.385)
2. By station/all events (A - 4b)						
Station 1	96.4	56.4	40.0 (±11.0)	40.3 (30.1, 48.8)	1.02 (0.51, 2.02)	-0.76 (.385)
Station 2	84.8	48.2	36.6 (±9.7)	34.0 (27.1, 44.4)	1.62 (0.82, 3.22)	-0.84 (.385)
Station 3	64.3	84.0	-19.7 (±17.8)	-18.5 (-28.0, -39.7)	0.52 (0.26, 1.03)	0.48 (.385)
Station 4	107.7	71.5	36.2 (±14.1)	39.1 (21.0, 47.8)	1.92 (0.97, 3.81)	-0.64 (.385)
Station 5	40.1	32.9	7.2 (±11.6)	6.1 (-1.9, 17.5)	0.75 (0.38, 1.49)	-0.32 (.385)
Station 6	71.8	31.6	40.2 (±9.7)	42.8 (29.8, 48.6)	2.18 (1.10, 4.31)	-0.88 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: COMPTER AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	790.8	1130.4	-339.6 (-454.8, -224.4)	-361.5 (-426.9, -310.4)	2.24 (1.13, 4.44)	0.88 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	508.9	681.0	-172.1 (-228.3, -115.9)	-214.3 (-247.4, -115.0)	0.83 (0.42, 1.65)	0.80 (.385)
STATION 2	535.0	868.6	-333.6 (-418.0, -249.2)	-309.6 (-368.8, -253.3)	0.36 (0.18, 0.72)	0.88 (.385)
STATION 3	580.0	1008.8	-428.8 (-554.8, -302.8)	-509.6 (-558.1, -374.2)	2.31 (1.16, 4.58)	0.92 (.385)
STATION 4	550.0	691.8	-141.8 (-214.8, -68.8)	-109.6 (-200.4, -69.1)	1.02 (0.52, 2.03)	0.64 (.385)
STATION 5	225.9	492.2	-266.3 (-414.2, -118.4)	-145.7 (-243.8, -67.5)	0.05 (0.03, 0.11)	0.56 (.385)
STATION 6	512.6	488.0	24.6 (-90.7, 139.9)	25.5 (-75.1, 77.2)	1.89 (0.95, 3.76)	-0.20 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	653.5	922.0	-268.5 (-359.4, -177.6)	-278.8 (-342.9, -232.1)	2.31 (1.17, 4.59)	0.84 (.385)
2.5 TO 5 M/SEC	652.0	1072.6	-420.6 (-543.3, -297.9)	-431.1 (-501.2, -353.1)	1.51 (0.76, 2.99)	0.92 (.385)
>5 M/SEC	489.9	619.4	-129.5 (-189.2, -69.8)	-157.7 (-202.5, -92.7)	3.36 (1.69, 6.67)	0.68 (.385)
B. STABILITY GROUP						
CLASS A & B	481.3	1003.4	-522.1 (-616.0, -428.2)	-487.4 (-585.2, -422.4)	0.36 (0.18, 0.71)	0.96 (.385)
CLASS C	678.9	989.9	-311.0 (-428.8, -193.2)	-352.3 (-412.0, -271.6)	2.44 (1.23, 4.84)	0.88 (.385)
CLASS D	586.6	619.4	-32.8 (-75.4, 9.8)	-47.5 (-73.0, -1.8)	1.25 (0.63, 2.47)	0.48 (.385)
CLASS E & F	398.0	605.9	-207.9 (-315.9, -99.9)	-262.8 (-309.0, -204.2)	6.12 (3.09, 12.15)	0.80 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: COMPTER AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-9A)	476.3	571.9	-95.6 (-153.0, -38.2)	-132.3 (-153.1, -43.2)	1.06 (0.53, 2.10)	0.52 (.385)
2. BY STATION/ALL EVENTS (A-9B)						
STATION 1	322.6	349.7	-27.1 (-69.7, 15.5)	-45.2 (-66.1, 6.9)	0.99 (0.50, 1.97)	0.32 (.385)
STATION 2	286.6	428.2	-141.6 (-203.4, -79.8)	-142.9 (-177.3, -81.0)	0.43 (0.21, 0.85)	0.64 (.385)
STATION 3	315.9	477.5	-161.6 (-237.8, -85.4)	-190.0 (-222.4, -124.3)	1.53 (0.77, 3.03)	0.72 (.385)
STATION 4	313.3	379.3	-66.0 (-115.8, -16.2)	-47.2 (-107.9, -24.8)	1.27 (0.64, 2.53)	0.52 (.385)
STATION 5	125.6	174.6	-49.0 (-111.6, 13.6)	-6.7 (-30.4, 22.6)	0.09 (0.05, 0.19)	-0.20 (.385)
STATION 6	257.9	182.7	75.2 (14.3, 136.1)	36.8 (2.8, 111.1)	2.00 (1.01, 3.97)	-0.40 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	316.2	396.4	-80.2 (-147.8, -12.6)	-67.7 (-107.9, -26.6)	0.55 (0.28, 1.10)	0.48 (.385)
2.5 TO 5 M/SEC	410.5	524.7	-114.2 (-173.6, -54.8)	-117.2 (-160.9, -68.5)	1.06 (0.54, 2.11)	0.60 (.385)
5 M/SEC	308.1	373.2	-65.1 (-121.2, -9.0)	-124.2 (-132.3, -44.3)	2.71 (1.36, 5.37)	0.60 (.385)
B. STABILITY GROUP						
CLASS A & B	228.3	437.7	-209.4 (-282.1, -136.7)	-232.2 (-270.8, -148.8)	1.03 (0.52, 2.04)	0.80 (.385)
CLASS C	359.0	487.4	-128.4 (-197.8, -59.0)	-119.3 (-170.3, -75.3)	0.94 (0.47, 1.87)	0.72 (.385)
CLASS D	385.5	407.9	-22.4 (-63.1, 18.3)	-36.3 (-68.2, 4.0)	3.06 (1.54, 6.07)	0.40 (.385)
CLASS E & F	196.9	263.5	-66.6 (-128.8, -4.4)	-62.5 (-113.0, -28.8)	1.26 (0.63, 2.49)	0.64 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: COMPTER AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_P ($\mu g/m^3$)	Performance Measures: Bias — Difference of Averages $C_O - C_P$ ($\mu g/m^3$)	Bias — Difference of Medians $M_O - M_P$ ($\mu g/m^3$)	Variance Comparison S_O^2/S_P^2	Frequency Distribution Comparison $[f(C_O) - f(C_P)]$ max (fraction)
1. All stations/all events (A - 4a)	126.7	147.0	-20.3 (±20.2)	-16.2 (-35.1, -3.9)	0.75 (0.38, 1.49)	0.48 (.385)
2. By station/all events (A - 4b)						
Station 1	97.4	76.9	20.5 (±19.4)	27.2 (11.2, 35.4)	0.86 (0.43, 1.70)	-0.52 (.385)
Station 2	65.4	81.2	-15.8 (±17.7)	-21.5 (-30.2, -0.1)	0.72 (0.36, 1.42)	0.36 (.385)
Station 3	78.1	105.4	-27.3 (±22.0)	-24.7 (-40.4, -14.6)	1.04 (0.52, 2.06)	0.52 (.385)
Station 4	84.5	100.4	-15.9 (±20.2)	5.8 (-16.2, 11.0)	0.17 (0.08, 0.33)	0.28 (.385)
Station 5	34.9	30.4	4.5 (±12.9)	12.2 (6.6, 18.5)	0.11 (0.06, 0.22)	-0.60 (.385)
Station 6	57.5	31.6	25.9 (±14.8)	17.4 (12.7, 29.9)	2.01 (1.01, 3.98)	-0.72 (.385)

TABLE A. COMPARISON OF 29 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: COMPTER AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	771.8	1146.7	-374.9 (-427.8, -322.0)	-368.4 (-421.4, -322.9)	0.75 (0.38, 1.48)	1.00 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	581.7	663.4	-81.7 (-147.8, -15.6)	-86.4 (-118.7, -215.7)	0.63 (0.32, 1.25)	0.44 (.385)
STATION 2	658.9	828.7	-169.8 (-248.0, -91.6)	-162.3 (-255.9, -83.4)	1.22 (0.62, 2.43)	0.52 (.385)
STATION 3	450.2	1116.0	-665.8 (-723.0, -608.6)	-695.5 (-724.6, -626.0)	1.19 (0.60, 2.36)	1.00 (.385)
STATION 4	546.7	708.6	-161.9 (-227.0, -96.8)	-106.2 (-205.6, -82.6)	0.50 (0.25, 1.00)	0.72 (.385)
STATION 5	321.3	523.2	-201.9 (-352.4, -51.4)	-201.7 (-297.0, -15.8)	0.23 (0.12, 0.46)	0.40 (.385)
STATION 6	496.8	557.4	-60.6 (-133.1, 11.9)	-52.5 (-97.4, 11.6)	0.40 (0.20, 0.79)	0.32 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	668.9	1022.3	-353.4 (-428.2, -278.6)	-343.3 (-428.2, -281.3)	1.08 (0.54, 2.14)	0.88 (.385)
2.5 TO 5 M/SEC	667.5	1047.1	-379.6 (-445.6, -313.6)	-408.8 (-447.8, -311.3)	0.66 (0.33, 1.31)	0.92 (.385)
>5 M/SEC	458.5	641.1	-182.6 (-273.0, -92.2)	-172.7 (-193.9, -134.4)	0.41 (0.21, 0.81)	0.80 (.385)
B. STABILITY GROUP						
CLASS A & B	541.4	1053.0	-511.6 (-593.0, -430.2)	-588.5 (-624.3, -436.0)	0.92 (0.46, 1.82)	0.96 (.385)
CLASS C	631.4	1036.4	-405.0 (-480 9, -329.1)	-419.0 (-487.4, -337.4)	1.56 (0.79, 3.10)	0.96 (.385)
CLASS D	672.4	569.2	103.2 (63.0, 143.4)	92.4 (52.2, 123.4)	8.27 (4.17, 16.40)	-0.72 (.385)
CLASS E & F	343.5	640.1	-296.6 (-353.1, -240.1)	-311.4 (-330.3, -259.8)	0.82 (0.41, 1.62)	0.96 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: COMPTER AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A=4A)	480.9	607.9	-127.0 (-184.2, -69.8)	-145.7 (-173.2, -64.3)	0.39 (0.20, 0.78)	0.56 (.385)
2. BY STATION/ALL EVENTS (A=4B)						
STATION 1	372.7	379.3	-6.6 (-58.8, 45.2)	9.7 (-28.2, 36.7)	0.57 (0.29, 1.12)	-0.16 (.385)
STATION 2	373.6	359.5	14.1 (-39.1, 67.3)	41.8 (-26.1, 65.6)	0.96 (0.48, 1.91)	-0.28 (.385)
STATION 3	252.8	532.3	-279.5 (-352.1, -206.9)	-251.3 (-331.1, -194.7)	0.26 (0.13, 0.51)	0.92 (.385)
STATION 4	360.2	369.8	-9.6 (-64.1, 44.9)	-30.3 (-52.8, 8.4)	1.41 (0.71, 2.80)	0.32 (.385)
STATION 5	177.1	213.4	-36.3 (-109.2, 36.6)	-30.5 (-80.5, 40.8)	0.32 (0.16, 0.64)	-0.32 (.385)
STATION 6	287.8	222.7	65.1 (16.8, 113.4)	98.2 (31.4, 126.9)	0.24 (0.12, 0.48)	-0.60 (.385)
3. BY METEOROLOGICAL CONDITION (A=5)						
A. WIND SPEED						
<2.5 M/SEC	338.6	426.2	-87.6 (-136.8, -38.4)	-70.5 (-134.4, -38.5)	0.59 (0.30, 1.16)	0.44 (.385)
2.5 TO 5 M/SEC	445.5	575.6	-130.1 (-196.6, -63.6)	-172.1 (-187.8, -47.5)	0.29 (0.15, 0.58)	0.52 (.385)
>5 M/SEC	316.0	358.6	-42.6 (-97.7, 12.5)	-40.8 (-87.9, -7.8)	1.21 (0.61, 2.41)	0.44 (.385)
B. STABILITY GROUP						
CLASS A & B	263.8	456.3	-192.5 (-258.4, -126.6)	-190.4 (-244.8, -119.1)	0.36 (0.18, 0.72)	0.64 (.385)
CLASS C	364.3	515.2	-150.9 (-219.4, -82.4)	-99.8 (-184.3, -81.7)	0.46 (0.23, 0.92)	0.72 (.385)
CLASS D	443.1	400.5	42.6 (2.1, 83.1)	38.8 (6.7, 70.9)	1.24 (0.63, 2.46)	-0.36 (.385)
CLASS E & F	217.9	289.8	-71.9 (-131.3, -12.5)	-44.8 (-88.4, -24.5)	0.47 (0.24, 0.94)	0.52 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: COMPTER AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_P ($\mu g/m^3$)	Performance Measures: Bias — Difference of Averages $C_O - C_P$ ($\mu g/m^3$)	Bias — Difference of Medians $M_O - M_P$ ($\mu g/m^3$)	Variance Comparison S_O^2/S_P^2	Frequency Distribution Comparison $[f(C_O) - f(C_P)]$ max (fraction)
1. All stations/all events (A - 4a)	125.3	152.0	-26.7 ($\pm$16.3)	-23.2 (-32.9, -11.1)	0.31 (0.16, 0.61)	0.52 (.385)
2. By station/all events (A - 4b)						
Station 1	96.4	89.8	6.6 ($\pm$15.9)	18.8 (-1.1, 25.4)	0.30 (0.15, 0.60)	-0.52 (.385)
Station 2	84.9	70.9	13.9 ($\pm$12.6)	16.0 (4.2, 26.9)	0.57 (0.29, 1.13)	-0.44 (.385)
Station 3	64.3	124.8	-60.5 ($\pm$20.1)	-58.3 (-67.5, -42.3)	0.35 (0.18, 0.69)	-0.80 (.385)
Station 4	107.7	110.1	-2.4 ($\pm$17.6)	5.0 (-13.6, 14.4)	0.72 (0.36, 1.43)	0.20 (.385)
Station 5	40.1	33.8	6.3 ($\pm$13.7)	10.2 (1.0, 18.6)	0.46 (0.23, 0.90)	-0.44 (.385)
Station 6	71.9	31.5	40.3 ($\pm$10.1)	43.4 (30.5, 49.6)	1.71 (0.86, 3.38)	-0.80 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED
SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: SCSTER AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-9A)	790.8	860.1	-69.3 (-185.8, 47.2)	-82.3 (-146.7, -31.0)	2.08 (1.05, 4.13)	0.44 (.385)
2. BY STATION/ALL EVENTS (A-9B)						
STATION 1	508.9	482.1	26.8 (-38.4, 92.0)	58.2 (13.2, 83.5)	0.51 (0.26, 1.01)	-0.56 (.385)
STATION 2	535.0	676.8	-141.8 (-214.2, -69.4)	-129.4 (-190.6, -73.5)	0.55 (0.28, 1.10)	0.64 (.385)
STATION 3	580.0	720.1	-140.1 (-271.1, -9.1)	-173.8 (-243.8, -69.8)	1.83 (0.92, 3.63)	0.52 (.385)
STATION 4	550.0	527.3	22.7 (-40.5, 85.9)	23.4 (-44.6, 80.8)	2.08 (1.05, 4.13)	-0.20 (.385)
STATION 5	225.9	202.9	23.0 (-101.0, 147.0)	162.8 (22.9, 169.7)	0.08 (0.04, 0.16)	-0.60 (.385)
STATION 6	512.6	450.4	62.2 (-54.8, 179.2)	49.0 (-34.7, 121.2)	1.74 (0.88, 3.46)	-0.32 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	653.5	749.3	-95.8 (-190.7, -0.9)	-122.6 (-174.7, -50.3)	1.80 (0.91, 3.56)	0.48 (.385)
2.5 TO 5 M/SEC	652.0	763.9	-111.9 (-230.1, 6.3)	-108.2 (-165.7, -77.1)	1.88 (0.93, 3.65)	0.64 (.385)
>5 M/SEC	489.9	230.8	259.1 (200.6, 317.6)	227.8 (182.4, 301.0)	4.09 (2.06, 8.11)	-0.96 (.385)
B. STABILITY GROUP						
CLASS A & B	481.3	839.3	-358.0 (-443.9, -272.1)	-336.0 (-411.2, -278.8)	0.45 (0.23, 0.90)	0.92 (.385)
CLASS C	678.9	658.5	20.4 (-85.8, 126.6)	-52.0 (-93.4, 31.4)	9.17 (4.62, 18.19)	0.40 (.385)
CLASS D	586.6	236.1	350.5 (312.0, 389.0)	337.6 (311.6, 377.3)	2.14 (1.08, 4.26)	-1.00 (.385)
CLASS E & F	398.0	72.3	325.7 (223.2, 428.2)	246.0 (198.1, 296.9)	110.50 (55.70,219.21)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: SCSTER AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-8A)	476.3	413.4	62.9 (6.0, 119.8)	64.4 (15.7, 106.9)	1.09 (0.55, 2.16)	-0.40 (.385)
2. BY STATION/ALL EVENTS (A-8B)						
STATION 1	322.6	203.6	119.0 (79.3, 158.7)	124.4 (81.6, 148.2)	1.35 (0.68, 2.67)	-0.68 (.385)
STATION 2	286.6	298.8	-12.2 (-77.7, 53.3)	-7.6 (-38.6, 49.1)	0.37 (0.19, 0.73)	-0.36 (.385)
STATION 3	315.9	295.4	20.5 (-50.7, 91.7)	-47.4 (-58.1, 89.9)	2.24 (1.13, 4.45)	-0.16 (.385)
STATION 4	313.3	231.8	81.5 (30.3, 132.7)	91.6 (42.8, 125.3)	1.12 (0.57, 2.23)	-0.60 (.385)
STATION 5	125.6	67.8	57.8 (6.9, 108.7)	96.2 (72.4, 108.4)	0.14 (0.07, 0.29)	-0.80 (.385)
STATION 6	257.9	162.6	95.3 (33.8, 156.8)	52.1 (16.9, 130.6)	1.89 (0.95, 3.76)	-0.52 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	316.2	283.0	33.2 (-38.4, 100.8)	55.7 (12.0, 81.9)	0.55 (0.28, 1.10)	-0.52 (.385)
2.5 TO 5 M/SEC	410.5	369.4	41.1 (-11.2, 93.4)	28.7 (-3.7, 73.7)	1.99 (1.00, 3.98)	-0.24 (.385)
>5 M/SEC	308.1	128.8	179.3 (126.6, 232.0)	128.4 (122.3, 186.3)	8.74 (2.39, 9.40)	-0.96 (.385)
B. STABILITY GROUP						
CLASS A & B	228.3	361.2	-132.9 (-203.0, -62.8)	-130.0 (-191.6, -83.9)	1.20 (0.61, 2.38)	0.68 (.385)
CLASS C	359.0	321.8	37.2 (-20.8, 95.2)	22.9 (-13.9, 59.7)	2.27 (1.14, 4.49)	-0.24 (.385)
CLASS D	385.5	187.8	197.7 (158.9, 236.5)	175.7 (150.6, 224.3)	8.77 (2.40, 9.46)	-0.96 (.385)
CLASS E & F	196.9	32.3	164.6 (116.3, 212.9)	131.8 (103.2, 154.7)	30.19 (15.22, 59.88)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: SCSTER AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Performance Measures: Bias: Difference of Medians $M_o - M_p$ ($\mu g/m^3$)	Performance Measures: Variance Comparison S_o^2/S_p^2	Performance Measures: Frequency Distribution Comparison $[f(C_o) - f(C_p)]_{max}$ (fraction)
1. All stations/all events (A - 4a)	126.7	72.6	54.1 ($\pm$14.7)	50.2 (37.0, 61.6)	4.60 (2.32, 9.10)	-0.92 (.385)
2. By station/all events (A - 4b)						
Station 1	97.4	34.7	62.7 ($\pm$14.4)	57.4 (46.6, 67.1)	5.99 (3.02, 11.86)	-0.96 (.385)
Station 2	65.4	45.8	19.6 ($\pm$14.9)	20.1 (10.6, 27.3)	1.43 (0.72, 2.83)	-0.60 (.385)
Station 3	78.1	49.7	28.4 ($\pm$18.1)	19.1 (10.3, 35.0)	3.07 (1.55, 6.08)	-0.48 (.385)
Station 4	84.5	45.2	39.3 ($\pm$8.9)	41.7 (29.7, 48.0)	2.72 (1.37, 5.39)	-0.88 (.385)
Station 5	34.9	10.3	24.6 ($\pm$8.4)	28.2 (24.2, 31.2)	0.31 (0.16, 0.61)	-0.84 (.385)
Station 6	57.5	28.2	29.3 (+14.7)	19.7 (14.7, 35.4)	2.07 (1.04, 4.10)	-0.72 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: SCSTER AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A=4A)	771.8	906.9	-135.1 (-205.2, -65.0)	-114.8 (-170.0, -62.4)	0.33 (0.16, 0.65)	0.56 (.385)
2. BY STATION/ALL EVENTS (A=4B)						
STATION 1	581.7	460.1	121.6 (67.1, 176.1)	90.6 (59.2, 165.4)	1.31 (0.66, 2.60)	-0.56 (.385)
STATION 2	658.9	633.4	25.5 (-57.4, 108.4)	64.5 (-43.4, 120.4)	0.96 (0.48, 1.90)	-0.24 (.385)
STATION 3	450.2	791.8	-341.6 (-414.7, -268.5)	-317.9 (-428.5, -256.5)	0.50 (0.25, 0.99)	0.92 (.385)
STATION 4	546.7	575.9	-29.2 (-92.6, 34.2)	-5.1 (-82.1, 41.8)	0.54 (0.27, 1.08)	0.20 (.385)
STATION 5	321.3	188.3	133.0 (-6.6, 272.6)	175.6 (130.7, 231.7)	0.28 (0.14, 0.56)	-0.76 (.385)
STATION 6	496.8	530.8	-34.0 (-112.4, 44.4)	-38.2 (-80.1, 51.8)	0.33 (0.17, 0.65)	-0.24 (.385)
3. BY METEOROLOGICAL CONDITION (A=5)						
A. WIND SPEED						
<2.5 M/SEC	668.9	826.5	-157.6 (-246.4, -68.8)	-133.9 (-220.3, -68.3)	0.58 (0.29, 1.16)	0.48 (.385)
2.5 TO 5 M/SEC	667.5	729.4	-61.9 (-134.3, 10.5)	-42.9 (-97.4, 8.8)	0.49 (0.25, 0.98)	0.28 (.385)
>5 M/SEC	458.5	318.1	140.4 (55.8, 225.0)	157.5 (120.3, 182.9)	0.50 (0.25, 0.99)	-0.88 (.385)
B. STABILITY GROUP						
CLASS A & B	541.4	894.0	-352.6 (-439.1, -266.1)	-379.5 (-424.9, -279.0)	0.74 (0.37, 1.46)	0.84 (.385)
CLASS C	631.4	668.4	-37.0 (-102.9, 28.9)	-86.2 (-127.1, 20.0)	4.46 (2.25, 8.85)	0.48 (.385)
CLASS D	672.4	250.2	422.2 (382.0, 462.4)	412.3 (369.8, 441.3)	8.13 (4.10, 16.13)	-1.00 (.385)
CLASS E & F	343.5	83.8	259.7 (219.3, 300.1)	225.7 (215.7, 269.2)	9.81 (4.95, 19.47)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: SCSTER AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	480.9	414.2	66.7 (22.3, 111.1)	70.4 (33.2, 107.4)	0.87 (0.44, 1.73)	-0.56 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	372.7	218.3	154.4 (113.1, 195.7)	165.3 (121.8, 186.4)	1.32 (0.66, 2.61)	-0.80 (.385)
STATION 2	373.6	250.6	123.0 (70.8, 175.2)	136.9 (78.5, 162.4)	1.04 (0.52, 2.05)	-0.76 (.385)
STATION 3	252.8	318.7	-65.9 (-124.1, -7.7)	-53.7 (-91.4, -11.6)	0.46 (0.23, 0.90)	0.40 (.385)
STATION 4	360.2	251.0	109.2 (58.0, 160.4)	83.3 (66.6, 124.2)	1.96 (0.99, 3.89)	-0.60 (.385)
STATION 5	177.1	72.4	104.5 (42.1, 166.9)	121.1 (88.5, 153.2)	0.49 (0.25, 0.98)	-0.80 (.385)
STATION 6	287.8	209.1	78.7 (29.9, 127.5)	109.0 (40.9, 143.2)	0.24 (0.12, 0.47)	-0.60 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	338.6	309.4	29.2 (-11.5, 69.9)	68.9 (-8.2, 70.4)	1.17 (0.59, 2.33)	-0.24 (.385)
2.5 TO 5 M/SEC	485.5	398.8	46.7 (-1.8, 95.2)	34.0 (12.5, 83.3)	0.72 (0.36, 1.43)	-0.48 (.385)
>5 M/SEC	316.0	160.0	156.0 (109.3, 202.7)	140.6 (109.0, 168.5)	3.38 (1.70, 6.70)	-0.80 (.385)
B. STABILITY GROUP						
CLASS A & B	263.8	367.1	-103.3 (-155.8, -50.8)	-114.8 (-150.4, -49.1)	0.71 (0.36, 1.41)	0.56 (.385)
CLASS C	364.3	341.8	22.5 (-26.0, 71.0)	20.9 (-24.3, 47.4)	1.71 (0.86, 3.40)	-0.16 (.385)
CLASS D	443.1	207.0	236.1 (203.1, 269.1)	217.7 (192.7, 252.2)	5.34 (2.69, 10.60)	-1.00 (.385)
CLASS E & F	217.9	35.1	182.8 (146.8, 218.8)	171.4 (141.4, 197.7)	7.36 (3.71, 14.61)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: SCSTER AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_P ($\mu g/m^3$)	Performance Measures: Bias — Difference of Averages $C_O - C_P$ ($\mu g/m^3$)	Bias — Difference of Medians $M_O - M_P$ ($\mu g/m^3$)	Variance Comparison S_O^2/S_P^2	Frequency Distribution Comparison $\lvert f(C_O) - f(C_P) \rvert$ max (fraction)
1. All stations/all events (A - 4a)	125.3	85.3	40.0 (±13.8)	39.8 (33.9, 50.9)	.47 (.24, .93)	-.88 (.385)
2. By station/all events (A - 4b)						
Station 1	96.4	47.2	49.2 (±11.3)	56.1 (41.2, 59.9)	.86 (.43, 1.71)	-.88 (.385)
Station 2	84.8	43.9	40.9 (±11.2)	45.4 (32.0, 52.4)	.77 (.39, 1.53)	-.84 (.385)
Station 3	64.3	63.4	.9 (±18.3)	-5.3 (-11.2, 16.7)	.45 (.23, .90)	-.32 (.385)
Station 4	107.7	54.0	53.7 (±12.8)	50.3 (38.9, 62.7)	3.16 (1.59, 6.26)	-.88 (.385)
Station 5	40.1	9.8	30.3 (±10.3)	32.4 (24.2, 34.4)	1.13 (.57, 2.25)	-.84 (.385)
Station 6	71.8	27.9	43.9 (±10.0)	47.9 (34.6, 53.5)	1.56 (.79, 3.09)	-.84 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: M3141 AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUEACY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	790.8	557.0	233.8 (131.2, 336.4)	194.9 (138.4, 227.9)	8.87 (4.47, 17.59)	-0.80 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	508.9	318.6	190.3 (145.8, 234.8)	176.6 (148.3, 208.5)	2.62 (1.32, 5.19)	-0.92 (.385)
STATION 2	535.0	427.4	107.6 (51.4, 163.8)	93.7 (51.5, 148.7)	1.45 (0.73, 2.87)	-0.56 (.385)
STATION 3	580.0	468.0	112.0 (-2.6, 226.6)	74.2 (-0.7, 141.0)	5.88 (2.97, 11.67)	-0.32 (.385)
STATION 4	550.0	388.1	161.9 (100.8, 223.0)	171.6 (88.7, 217.1)	2.59 (1.30, 5.13)	-0.60 (.385)
STATION 5	254.0	240.0	-14.1 (-89.8, 61.6)	43.2 (-51.6, 73.3)	0.24 (0.12, 0.47)	-0.40 (.385)
STATION 6	512.6	306.0	206.6 (107.0, 306.2)	175.0 (102.4, 212.1)	7.81 (3.93, 15.48)	-0.72 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	653.5	515.0	138.5 (54.7, 222.3)	97.7 (52.1, 161.1)	4.97 (2.50, 9.85)	-0.52 (.385)
2.5 TO 5 M/SEC	652.0	467.3	184.7 (82.9, 286.5)	153.6 (101.8, 187.1)	7.49 (3.78, 14.87)	-0.76 (.385)
>5 M/SEC	489.9	181.8	308.5 (251.4, 365.6)	280.4 (228.5, 333.6)	5.32 (2.68, 10.55)	-1.00 (.385)
B. STABILITY GROUP						
CLASS A & B	481.3	541.9	-60.6 (-121.0, -0.2)	-53.3 (-120.3, -13.1)	1.70 (0.86, 3.38)	0.48 (.385)
CLASS C	678.9	427.7	251.2 (147.3, 355.1)	174.6 (139.4, 260.2)	19.53 (9.84, 38.74)	-0.84 (.385)
CLASS D	586.6	171.2	415.4 (377.0, 453.8)	399.8 (374.8, 446.3)	2.17 (1.10, 4.31)	-1.00 (.385)
CLASS E & F	398.0	61.1	336.9 (234.8, 439.0)	245.0 (203.1, 309.8)	754.33 (381.0 1493.6)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED
SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: M3141 AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	476.3	296.9	179.4 (133.5, 225.3)	151.6 (128.1, 203.8)	4.25 (2.14, 8.44)	-0.92 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	322.6	160.6	162.0 (127.7, 196.3)	153.5 (120.6, 180.1)	3.52 (1.77, 6.98)	-1.00 (.385)
STATION 2	286.6	226.5	60.1 (13.9, 106.3)	47.9 (26.2, 85.3)	1.15 (0.58, 2.28)	-0.56 (.385)
STATION 3	315.9	224.0	91.9 (25.9, 157.9)	11.7 (13.1, 105.9)	4.38 (2.21, 8.69)	-0.40 (.385)
STATION 4	313.3	193.9	119.4 (73.7, 165.1)	128.9 (75.3, 154.4)	1.98 (1.00, 3.92)	-0.68 (.385)
STATION 5	125.6	93.9	31.7 (-7.7, 71.1)	55.2 (20.9, 76.8)	0.27 (0.13, 0.53)	-0.64 (.385)
STATION 6	257.9	137.6	120.3 (65.3, 175.3)	85.5 (58.2, 126.6)	4.78 (2.41, 9.48)	-0.64 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	316.2	223.6	92.6 (39.3, 145.9)	109.1 (65.6, 121.7)	1.35 (0.68, 2.68)	-0.64 (.385)
2.5 TO 5 M/SEC	410.5	265.8	144.7 (99.5, 189.9)	126.4 (88.0, 165.9)	11.53 (5.81, 22.87)	-0.88 (.385)
>5 M/SEC	308.1	112.7	195.4 (144.8, 246.0)	141.2 (129.1, 203.0)	11.16 (5.62, 22.13)	-0.96 (.385)
B. STABILITY GROUP						
CLASS A & B	228.3	265.7	-37.4 (-96.7, 21.9)	-55.1 (-104.4, -11.6)	3.38 (1.71, 6.71)	0.36 (.385)
CLASS C	359.0	246.4	112.6 (61.3, 163.9)	84.1 (12.5, 113.2)	11.00 (5.55, 21.83)	-0.68 (.385)
CLASS D	385.5	134.3	251.2 (214.0, 288.4)	230.1 (150.7, 276.8)	12.59 (6.35, 24.98)	-1.00 (.385)
CLASS E & F	196.9	30.8	166.1 (118.3, 213.9)	130.0 (100.8, 155.8)	101.85 (51.34,202.04)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: 3141 AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Difference of Averages $\bar{C}_O - \bar{C}_p$ ($\mu g/m^3$)	Performance Measures: Bias: Difference of Medians $M_O - M_p$ ($\mu g/m^3$)	Performance Measures: Variance Comparison S_O^2/S_p^2	Performance Measures: Frequency Distribution Comparison $[f(C_O) - f(C_p)]$ max (fraction)
1. All stations/all events (A - 4a)	126.7	63.1	63.6 (±14.3)	57.8 (44.8, 71.6)	6.10 (3.08, 12.10)	-1.00 (.385)
2. By station/all events (A - 4b)						
Station 1	97.4	35.4	62.0 (±14.4)	57.6 (47.0, 66.1)	5.47 (2.76, 10.85)	-.96 (.385)
Station 2	65.4	39.9	25.5 (±13.5)	20.7 (14.1, 30.3)	2.55 (1.29, 5.06)	-.72 (.385)
Station 3	78.1	43.6	34.5 (±17.3)	22.3 (15.6, 38.1)	5.09 (2.55, 10.02)	-.60 (.385)
Station 4	84.5	45.1	39.4 (±8.4)	42.1 (29.1, 48.6)	4.32 (2.18, 8.58)	-.92 (.385)
Station 5	34.9	14.3	20.6 (±7.0)	23.0 (18.2, 26.6)	.49 (.25, .97)	-.76 (.385)
Station 6	57.5	26.1	31.4 (±13.7)	23.8 (17.7, 33.5)	3.74 (1.88, 7.41)	-.72 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: M3141 AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-0A)	771.8	565.6	206.2 (152.1, 260.3)	243.3 (170.1, 264.2)	0.69 (0.35, 1.37)	-0.80 (.385)
2. BY STATION/ALL EVENTS (A-0B)						
STATION 1	581.7	299.6	282.1 (237.4, 326.8)	273.3 (224.0, 312.7)	5.83 (2.94, 11.57)	-1.00 (.385)
STATION 2	658.9	416.9	242.0 (178.7, 305.3)	250.3 (141.3, 315.8)	5.57 (2.81, 11.04)	-0.92 (.385)
STATION 3	450.2	526.0	-75.8 (-133.1, -18.5)	-79.4 (-113.4, -45.8)	1.18 (0.59, 2.33)	0.56 (.385)
STATION 4	546.7	403.8	142.9 (97.1, 188.7)	153.0 (91.4, 181.6)	2.06 (1.04, 4.10)	-0.72 (.385)
STATION 5	321.3	196.0	125.3 (31.6, 219.0)	128.1 (77.0, 167.1)	0.93 (0.47, 1.84)	-0.68 (.385)
STATION 6	496.8	349.2	147.6 (101.5, 193.7)	136.0 (109.0, 164.9)	2.42 (1.22, 4.80)	-0.84 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	668.9	522.8	146.1 (74.1, 218.1)	172.9 (76.2, 219.2)	1.27 (0.64, 2.53)	-0.64 (.385)
2.5 TO 5 M/SEC	667.5	481.7	185.8 (136.7, 234.9)	173.0 (133.6, 216.5)	2.53 (1.28, 5.03)	-0.92 (.385)
>5 M/SEC	458.5	199.1	259.4 (194.6, 324.2)	252.7 (223.5, 276.7)	1.31 (0.66, 2.60)	-0.84 (.385)
B. STABILITY GROUP						
CLASS A & B	541.4	559.0	-17.6 (-88.7, 53.5)	-21.1 (-74.9, 17.9)	1.68 (0.85, 3.34)	-0.08 (.385)
CLASS C	631.4	440.3	191.1 (128.8, 253.4)	153.5 (86.6, 255.9)	16.90 (8.52, 33.52)	-0.84 (.385)
CLASS D	672.4	150.3	522.1 (483.3, 560.9)	510.9 (469.8, 531.7)	33.20 (16.74, 65.87)	-1.00 (.385)
CLASS E & F	343.5	66.1	277.9 (238.3, 316.5)	236.7 (225.0, 283.7)	70.98 (35.76,140.74)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: M3141 AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	480.9	290.6	190.3 (154.7, 225.9)	173.1 (144.3, 236.2)	2.79 (1.40, 5.53)	-0.96 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	372.7	163.7	209.0 (175.1, 242.9)	204.0 (165.4, 225.1)	5.85 (2.95, 11.61)	-1.00 (.385)
STATION 2	373.6	194.2	179.4 (136.1, 222.7)	193.5 (130.6, 210.3)	2.95 (1.49, 5.86)	-0.88 (.385)
STATION 3	252.8	240.3	12.5 (-31.0, 56.0)	-13.4 (-26.7, 38.0)	1.27 (0.64, 2.53)	-0.28 (.385)
STATION 4	360.2	203.6	156.6 (110.8, 202.4)	116.9 (103.8, 162.8)	5.16 (2.60, 10.23)	-0.80 (.385)
STATION 5	177.1	89.2	86.9 (47.9, 185.9)	74.8 (58.6, 129.3)	1.15 (0.58, 2.28)	-0.76 (.385)
STATION 6	287.8	157.7	130.1 (96.6, 163.6)	153.7 (105.2, 162.1)	0.67 (0.34, 1.32)	-0.80 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	338.6	227.3	111.3 (74.3, 148.3)	131.2 (77.4, 143.0)	1.88 (0.95, 3.73)	-0.60 (.385)
2.5 TO 5 M/SEC	445.5	274.7	170.8 (132.3, 209.3)	137.7 (130.4, 193.0)	2.01 (1.01, 3.98)	-0.92 (.385)
>5 M/SEC	316.0	124.2	191.8 (146.4, 237.2)	177.2 (146.7, 195.8)	4.39 (2.21, 8.71)	-0.92 (.385)
B. STABILITY GROUP						
CLASS A & B	263.8	254.5	9.3 (-33.9, 52.5)	-14.6 (-37.3, 49.6)	1.59 (0.80, 3.16)	-0.20 (.385)
CLASS C	364.3	251.2	113.1 (71.8, 154.4)	103.2 (64.0, 126.8)	8.74 (4.40, 17.33)	-0.76 (.385)
CLASS D	443.1	136.8	306.3 (274.9, 337.7)	279.7 (258.2, 319.9)	20.99 (10.58, 41.64)	-1.00 (.385)
CLASS E & F	217.9	34.9	183.0 (148.0, 218.0)	173.0 (136.7, 199.2)	27.79 (14.01, 55.12)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: 3141 AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_P ($\mu g/m^3$)	Performance Measures: Bias: Difference of Averages $C_O - C_P$ ($\mu g/m^3$)	Performance Measures: Bias: Difference of Medians $M_O - M_P$ ($\mu g/m^3$)	Performance Measures: Variance Comparison S_O^2/S_P^2	Performance Measures: Frequency Distribution Comparison $[f(C_O) - f(C_P)]$ max (fraction)
1. All stations/all events (A - 4a)	125.3	69.9	55.4 (±10.3)	53.0 (46.5, 61.8)	1.37 (0.69, 2.72)	-0.92 (.385)
2. By station/all events (A - 4b)						
Station 1	95.4	43.9	52.5 (±9.4)	55.3 (43.5, 59.4)	2.01 (1.01, 3.97)	-1.00 (.385)
Station 2	84.8	39.4	45.4 (±9.2)	44.3 (35.6, 53.2)	1.84 (0.93, 3.65)	-0.92 (.385)
Station 3	64.3	53.4	10.9 (±14.2)	9.5 (0.5, 18.9)	1.07 (0.54, 2.12)	-0.48 (.385)
Station 4	107.7	54.0	53.7 (±12.0)	50.2 (37.6, 60.5)	9.21 (4.65, 18.23)	-0.96 (.385)
Station 5	40.1	12.6	27.5 (±9.0)	23.3 (18.8, 31.1)	2.32 (1.17, 4.59)	-0.84 (.385)
Station 6	71.8	24.6	47.2 (±9.0)	49.8 (35.7, 54.7)	3.37 (1.70, 6.67)	-0.96 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MAIN1 AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	790.8	557.0	233.8 (131.2, 336.4)	194.9 (138.4, 227.9)	8.87 (4.47, 17.59)	-0.80 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	508.9	318.6	190.3 (145.8, 234.8)	176.6 (148.3, 208.5)	2.62 (1.32, 5.19)	-0.92 (.385)
STATION 2	535.0	427.4	107.6 (51.4, 163.8)	93.7 (51.5, 148.7)	1.45 (0.73, 2.87)	-0.56 (.385)
STATION 3	580.0	468.0	112.0 (-2.6, 226.6)	74.2 (-0.7, 141.8)	5.88 (2.97, 11.67)	-0.32 (.385)
STATION 4	550.0	388.1	161.9 (100.8, 223.0)	171.6 (88.7, 217.1)	2.59 (1.30, 5.13)	-0.60 (.385)
STATION 5	225.9	240.0	-14.1 (-89.8, 61.6)	43.2 (-51.6, 73.3)	0.24 (0.12, 0.47)	-0.40 (.385)
STATION 6	512.6	306.0	206.6 (107.8, 306.2)	175.0 (102.4, 212.2)	7.81 (3.93, 15.48)	-0.72 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	653.5	515.0	138.5 (54.7, 222.3)	97.7 (52.1, 161.1)	4.97 (2.50, 9.85)	-0.52 (.385)
2.5 TO 5 M/SEC	652.0	467.3	184.7 (82.9, 286.5)	153.6 (101.8, 187.1)	7.49 (3.78, 14.87)	-0.76 (.385)
>5 M/SEC	489.9	181.4	308.5 (251.4, 365.6)	280.4 (228.5, 333.6)	5.32 (2.68, 10.55)	-1.00 (.385)
B. STABILITY GROUP						
CLASS A & B	481.3	541.9	-60.6 (-121.0, -0.2)	-53.3 (-120.3, -13.1)	1.70 (0.86, 3.38)	0.48 (.385)
CLASS C	678.9	427.7	251.2 (147.3, 355.1)	174.6 (139.4, 260.2)	19.53 (9.84, 38.74)	-0.84 (.385)
CLASS D	586.6	171.2	415.4 (377.0, 453.8)	399.8 (374.8, 446.3)	2.17 (1.10, 4.31)	-1.00 (.385)
CLASS E & F	398.0	151.4	246.6 (144.2, 349.0)	157.0 (116.7, 220.3)	130.48 (65.77,258.85)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MPTER AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	476.3	296.9	179.4 (133.5, 225.3)	151.6 (128.1, 203.8)	4.25 (2.14, 8.44)	-0.92 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	322.6	163.1	159.5 (125.6, 193.4)	148.2 (119.2, 176.6)	3.93 (1.98, 7.80)	-1.00 (.385)
STATION 2	286.6	226.5	60.1 (13.9, 106.3)	47.9 (26.2, 85.3)	1.15 (0.58, 2.28)	-0.56 (.385)
STATION 3	315.9	224.0	91.9 (25.9, 157.9)	11.7 (13.1, 105.9)	4.38 (2.21, 8.69)	-0.40 (.385)
STATION 4	313.3	194.5	118.8 (73.1, 164.5)	128.9 (75.1, 154.3)	1.98 (1.00, 3.90)	-0.68 (.385)
STATION 5	125.6	93.9	31.7 (-7.7, 71.1)	55.2 (20.9, 76.8)	0.27 (0.13, 0.53)	-0.64 (.385)
STATION 6	257.9	137.6	120.3 (65.3, 175.3)	85.5 (58.2, 126.6)	4.78 (2.41, 9.48)	-0.64 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	316.2	224.2	92.0 (38.8, 145.2)	104.3 (61.3, 120.0)	1.36 (0.69, 2.70)	-0.64 (.385)
2.5 TO 5 M/SEC	410.5	265.8	144.7 (99.5, 189.9)	126.4 (88.0, 165.9)	11.53 (5.81, 22.87)	-0.88 (.385)
>5 M/SEC	308.1	112.7	195.4 (144.8, 246.0)	141.2 (129.1, 203.8)	11.16 (5.62, 22.13)	-0.96 (.385)
B. STABILITY GROUP						
CLASS A & B	228.3	265.7	-37.4 (-96.7, 21.9)	-55.1 (-108.8, -11.6)	3.38 (1.71, 6.71)	0.36 (.385)
CLASS C	359.0	246.4	112.6 (61.3, 163.9)	84.1 (52.5, 113.2)	11.00 (5.55, 21.83)	-0.68 (.385)
CLASS D	385.5	134.9	250.6 (213.3, 287.9)	230.1 (200.1, 276.7)	11.37 (5.73, 22.56)	-1.00 (.385)
CLASS E & F	196.9	78.1	118.8 (70.3, 167.3)	87.6 (58.2, 108.2)	22.31 (11.25, 44.26)	-0.88 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: 4141 AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias — Difference of Averages $C_O - C_p$ ($\mu g/m^3$)	Bias — Difference of Medians $M_O - M_p$ ($\mu g/m^3$)	Variance Comparison s_o^2/s_p^2	Frequency Distribution Comparison $[t(C_O) - t(C_p)]$ max (fraction)
1. All stations/all events (A - 4a)	126.7	64.0	62.7 (±14.3)	57.3 (43.6, 71.1)	6.59 (3.32, 13.06)	-1.00 (.385)
2. By station/all events (A - 4b)						
Station 1	97.4	38.4	59.0 (±14.3)	53.7 (43.5, 63.2)	5.76 (2.91, 11.43)	-.96 (.385)
Station 2	65.4	40.0	25.4 (±13.5)	20.7 (13.9, 30.1)	2.56 (1.29, 5.08)	-.68 (.385)
Station 3	78.1	43.6	34.5 (±17.2)	22.3 (15.6, 38.1)	5.07 (2.56, 10.06)	-.60 (.385)
Station 4	84.5	46.6	37.9 (±8.5)	42.0 (27.3, 47.5)	3.84 (1.93, 7.61)	-.88 (.385)
Station 5	34.9	14.3	20.6 (±7.0)	23.0 (18.2, 26.6)	.49 (.25, .98)	-.76 (.385)
Station 6	57.5	26.0	31.5 (±13.7)	23.8 (17.7, 33.5)	3.74 (1.88, 7.41)	-.72 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: M4141 AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	771.8	565.6	206.2 (152.1, 260.3)	243.3 (170.1, 264.2)	0.69 (0.35, 1.37)	-0.80 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	581.7	299.6	282.1 (237.4, 326.8)	273.3 (224.0, 312.7)	5.83 (2.94, 11.57)	-1.00 (.385)
STATION 2	658.9	416.9	242.0 (178.7, 305.3)	250.3 (141.3, 315.9)	5.57 (2.81, 11.04)	-0.92 (.385)
STATION 3	450.2	526.0	-75.8 (-133.1, -18.5)	-79.4 (-113.4, -45.8)	1.18 (0.59, 2.33)	0.56 (.385)
STATION 4	546.7	403.8	142.9 (97.1, 188.7)	153.0 (91.4, 181.6)	2.06 (1.04, 4.10)	-0.72 (.385)
STATION 5	321.3	196.0	125.3 (31.6, 219.0)	128.1 (77.0, 167.1)	0.93 (0.47, 1.84)	-0.68 (.385)
STATION 6	496.8	349.2	147.6 (101.5, 193.7)	136.0 (109.0, 164.9)	2.42 (1.22, 4.80)	-0.84 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	668.9	522.8	146.1 (74.1, 218.1)	172.9 (76.2, 219.2)	1.27 (0.64, 2.53)	-0.64 (.385)
2.5 TO 5 M/SEC	667.5	481.7	185.8 (136.7, 234.9)	173.0 (133.6, 216.5)	2.53 (1.28, 5.03)	-0.92 (.385)
>5 M/SEC	458.5	199.1	259.4 (194.6, 324.2)	252.7 (223.5, 276.7)	1.31 (0.66, 2.60)	-0.84 (.385)
B. STABILITY GROUP						
CLASS A & B	541.4	559.0	-17.6 (-88.7, 53.5)	-21.1 (-74.9, 17.9)	1.68 (0.85, 3.34)	-0.08 (.385)
CLASS C	631.4	440.3	191.1 (128.8, 253.4)	153.5 (86.6, 255.9)	16.90 (8.52, 33.52)	-0.84 (.385)
CLASS D	672.4	150.3	522.1 (483.3, 560.9)	510.9 (469.8, 531.7)	33.20 (16.74, 65.87)	-1.00 (.385)
CLASS E & F	343.5	158.9	184.6 (144.8, 224.4)	145.6 (135.8, 194.1)	14.79 (7.46, 29.35)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: M4141 AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	480.9	290.6	190.3 (154.7, 225.9)	173.1 (144.3, 236.2)	2.79 (1.40, 5.53)	-0.96 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	372.7	166.9	205.8 (172.0, 239.6)	199.3 (161.5, 223.2)	6.20 (3.12, 12.29)	-1.00 (.385)
STATION 2	373.6	194.2	179.4 (136.1, 222.7)	193.5 (130.6, 210.3)	2.95 (1.49, 5.86)	-0.88 (.385)
STATION 3	252.8	240.3	12.5 (-31.0, 56.0)	-13.4 (-26.7, 38.0)	1.27 (0.64, 2.53)	-0.28 (.385)
STATION 4	360.2	203.6	156.6 (110.8, 202.4)	116.9 (103.8, 162.8)	5.16 (2.60, 10.23)	-0.80 (.385)
STATION 5	177.1	80.2	96.9 (47.9, 145.9)	74.8 (58.8, 129.3)	1.15 (0.58, 2.28)	-0.76 (.385)
STATION 6	287.8	157.7	130.1 (96.6, 163.6)	153.7 (105.2, 162.1)	0.67 (0.34, 1.32)	-0.80 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	338.6	227.3	111.3 (74.3, 148.3)	131.2 (77.4, 143.0)	1.88 (0.95, 3.73)	-0.60 (.385)
2.5 TO 5 M/SEC	445.5	274.7	170.8 (132.3, 209.3)	137.7 (130.4, 193.0)	2.01 (1.01, 3.98)	-0.92 (.385)
>5 M/SEC	316.0	124.2	191.8 (146.4, 237.2)	177.2 (146.6, 195.8)	4.39 (2.21, 8.71)	-0.92 (.385)
B. STABILITY GROUP						
CLASS A & B	263.8	254.5	9.3 (-33.9, 52.5)	-14.6 (-37.3, 49.6)	1.59 (0.80, 3.16)	-0.20 (.385)
CLASS C	364.3	251.2	113.1 (71.8, 154.4)	103.2 (64.0, 126.8)	8.74 (4.40, 17.33)	-0.76 (.385)
CLASS D	443.1	136.8	306.3 (274.9, 337.7)	279.7 (258.2, 319.9)	21.15 (10.66, 41.96)	-1.00 (.385)
CLASS E & F	217.9	79.2	138.7 (101.6, 175.8)	138.8 (96.3, 154.1)	4.94 (2.49, 9.81)	-0.92 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: 4141 AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias — Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Bias — Difference of Medians $M_o - M_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[F(C_o) - F(C_p)]$ max (fraction)
1. All stations/all events (A - 4a)	125.3	71.9	53.4 (±10.1)	54.6 (44.0, 59.8)	1.49 (.75, 2.96)	-.92 (.385)
2. By station/all events (A - 4b)						
Station 1	96.4	46.8	49.6 (±9.7)	52.9 (40.4, 57.7)	1.68 (.85, 3.33)	-.96 (.385)
Station 2	84.8	39.6	45.2 (±9.2)	44.1 (35.3, 53.0)	1.84 (.93, 3.66)	-.92 (.385)
Station 3	64.3	53.4	10.9 (±14.2)	9.5 (0.5, 18.9)	1.07 (.54, 2.12)	-.48 (.385)
Station 4	107.7	55.3	52.4 (±12.0)	49.5 (36.4, 59.2)	8.43 (4.25, 16.72)	-.96 (.385)
Station 5	40.1	12.6	27.5 (±9.0)	23.3 (18.9, 31.1)	2.32 (1.17, 4.60)	-.84 (.385)
Station 6	71.8	24.6	47.2 (±8.9)	49.8 (35.7, 54.7)	3.37 (1.70, 6.68)	-.84 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: TEM-8A AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-8A)	790.8	951.6	-160.8 (-309.8, -11.8)	-140.4 (-202.1, -77.7)	0.70 (0.35, 1.40)	0.60 (.385)
2. BY STATION/ALL EVENTS (A-8B)						
STATION 1	508.9	490.7	18.2 (-53.1, 89.5)	28.2 (-22.8, 94.1)	0.39 (0.20, 0.78)	-0.40 (.385)
STATION 2	535.0	533.5	1.5 (-89.5, 92.5)	43.3 (-65.0, 110.7)	0.30 (0.15, 0.59)	-0.40 (.385)
STATION 3	580.0	720.5	-140.5 (-344.6, 63.6)	-67.2 (-300.6, 80.3)	0.37 (0.19, 0.73)	-0.32 (.385)
STATION 4	550.0	632.9	-82.9 (-157.4, -8.4)	-67.0 (-152.3, -8.4)	0.95 (0.48, 1.88)	0.40 (.385)
STATION 5	225.9	248.2	-22.3 (-95.6, 51.0)	5.1 (-56.5, 53.7)	0.26 (0.13, 0.51)	-0.36 (.385)
STATION 6	512.6	391.6	121.0 (3.3, 238.7)	130.0 (-52.0, 162.4)	1.69 (0.85, 3.35)	-0.92 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	653.5	786.9	-133.4 (-223.1, -43.7)	-156.0 (-232.4, -98.2)	2.54 (1.28, 5.05)	0.64 (.385)
2.5 TO 5 M/SEC	652.0	694.2	-42.2 (-202.8, 118.4)	-8.7 (-112.3, 95.8)	0.54 (0.27, 1.07)	-0.36 (.385)
>5 M/SEC	489.9	214.9	275.0 (121.2, 428.8)	348.1 (280.3, 379.7)	0.13 (0.07, 0.26)	-0.84 (.385)
B. STABILITY GROUP						
CLASS A & B	481.3	662.8	-181.5 (-274.3, -88.7)	-219.6 (-289.5, -62.5)	0.37 (0.19, 0.73)	0.52 (.385)
CLASS C	678.9	871.8	-192.9 (-355.4, -30.4)	-194.9 (-252.6, -77.7)	0.59 (0.30, 1.18)	0.60 (.385)
CLASS D	586.6	211.4	375.2 (311.2, 439.2)	398.6 (357.1, 432.9)	0.33 (0.17, 0.66)	-0.96 (.385)
CLASS E & F	398.0	8.7	389.3 (287.3, 491.4)	301.2 (256.2, 363.8)	1249.0 (630.8 ,2473.1)	-1.00 (.385)

TABLE A. COMPARISON OF >5 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: TEM-8A AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-9A)	476.3	436.7	39.6 (-41.4, 120.6)	90.8 (25.4, 112.3)	0.35 (0.18, 0.70)	-0.56 (.385)
2. BY STATION/ALL EVENTS (A-9B)						
STATION 1	322.6	231.6	91.0 (43.2, 138.8)	105.0 (62.2, 132.2)	0.66 (0.33, 1.30)	-0.64 (.385)
STATION 2	286.6	260.2	26.4 (-20.7, 73.5)	18.8 (-1.0, 52.2)	1.06 (0.53, 2.10)	-0.36 (.385)
STATION 3	315.9	336.3	-20.4 (-125.3, 84.5)	-21.0 (-54.7, 63.1)	0.47 (0.24, 0.93)	-0.28 (.385)
STATION 4	313.3	293.3	20.0 (-25.9, 65.9)	26.8 (-27.3, 58.7)	1.92 (0.97, 3.81)	-0.16 (.385)
STATION 5	125.6	98.5	27.1 (-10.7, 64.9)	50.8 (3.3, 72.1)	0.30 (0.15, 0.59)	-0.56 (.385)
STATION 6	257.9	196.3	61.6 (6.2, 117.0)	23.3 (-5.7, 68.4)	4.38 (2.21, 8.68)	-0.28 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	316.2	306.5	9.7 (-41.9, 61.3)	2.4 (-32.7, 32.3)	1.58 (0.80, 3.14)	0.16 (.385)
2.5 TO 5 M/SEC	410.5	384.5	26.0 (-59.2, 111.2)	87.1 (22.2, 100.6)	0.34 (0.17, 0.67)	-0.52 (.385)
>5 M/SEC	308.1	94.0	214.1 (147.2, 281.0)	191.8 (173.7, 236.3)	1.03 (0.52, 2.05)	-0.92 (.385)
B. STABILITY GROUP						
CLASS A & B	228.3	301.2	-72.9 (-141.1, -4.7)	-66.9 (-121.2, -33.5)	1.36 (0.69, 2.70)	0.52 (.385)
CLASS C	359.0	386.5	-27.5 (-114.0, 59.0)	-10.7 (-43.5, 39.6)	0.45 (0.23, 0.90)	-0.16 (.385)
CLASS D	385.5	171.1	214.4 (167.8, 261.0)	220.1 (170.1, 254.3)	1.32 (0.66, 2.61)	-0.96 (.385)
CLASS E & F	196.9	3.4	193.5 (145.9, 241.1)	157.9 (121.8, 183.9)	953.00 (481.3 ,1886.9)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: TEM-8A AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Performance Measures: Bias: Difference of Medians $M_o - M_p$ ($\mu g/m^3$)	Performance Measures: Variance Comparison S_o^2/S_p^2	Performance Measures: Frequency Distribution Comparison $\lvert f(C_o) - f(C_p) \rvert$ max (fraction)
1. All stations/all events (A - 4a)	126.7	80.2	46.5 ($\pm$15.2)	42.0 (29.8, 54.3)	3.18 (1.60, 6.30)	-.84 (.385)
2. By station/all events (A - 4b)						
Station 1	97.4	44.5	52.9 ($\pm$15.1)	47.6 (36.8, 59.2)	3.33 (1.68, 6.60)	-.84 (.385)
Station 2	65.4	45.7	19.7 ($\pm$12.9)	15.5 (7.4, 23.6)	3.86 (1.95, 7.66)	-.84 (.385)
Station 3	78.1	57.2	20.9 ($\pm$19.3)	13.1 (5.5, 29.0)	1.93 (.97, 3.83)	-.48 (.385)
Station 4	84.5	57.0	27.5 ($\pm$10.1)	34.9 (16.9, 40.0)	1.27 (.64, 2.51)	-.64 (.385)
Station 5	34.9	16.4	18.5 ($\pm$7.5)	22.0 (15.3, 25.6)	.41 (.21, .82)	-.68 (.385)
Station 6	57.5	36.5	21.0 ($\pm$13.1)	9.2 (5.3, 21.7)	6.37 (3.21, 12.63)	-.40 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: TEM-8A AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-8A)	771.8	732.9	38.9 (-46.0, 123.8)	91.0 (3.4, 141.3)	0.20 (0.10, 0.40)	-0.48 (.385)
2. BY STATION/ALL EVENTS (A-8B)						
STATION 1	581.7	384.0	197.7 (123.6, 271.8)	218.6 (160.6, 271.6)	0.44 (0.22, 0.88)	-0.76 (.385)
STATION 2	658.9	356.3	302.6 (224.2, 381.0)	357.6 (223.3, 390.7)	1.21 (0.61, 2.40)	-0.80 (.385)
STATION 3	450.2	443.7	6.5 (-95.9, 108.9)	85.4 (18.9, 93.1)	0.21 (0.10, 0.41)	-0.56 (.385)
STATION 4	546.7	510.6	36.1 (-39.1, 111.3)	63.7 (-2.8, 116.8)	0.34 (0.17, 0.67)	-0.40 (.385)
STATION 5	321.3	245.3	76.0 (-14.1, 166.1)	38.2 (23.9, 116.0)	1.09 (0.55, 2.16)	-0.44 (.385)
STATION 6	496.8	434.3	62.5 (-27.1, 152.1)	84.8 (15.3, 153.5)	0.23 (0.12, 0.46)	-0.60 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	668.9	711.5	-42.6 (-138.7, 53.5)	-3.8 (-103.8, 57.7)	0.46 (0.23, 0.91)	0.16 (.385)
2.5 TO 5 M/SEC	667.5	385.4	282.1 (227.7, 336.5)	291.6 (236.0, 323.6)	1.41 (0.71, 2.79)	-0.96 (.385)
>5 M/SEC	458.5	152.2	306.3 (223.0, 389.6)	311.2 (280.8, 339.8)	0.52 (0.26, 1.04)	-0.96 (.385)
B. STABILITY GROUP						
CLASS A & B	541.4	560.1	-18.7 (-115.4, 78.0)	21.3 (-50.8, 48.4)	0.51 (0.26, 1.02)	0.12 (.385)
CLASS C	631.4	630.2	1.2 (-96.2, 98.6)	34.1 (-59.8, 99.6)	0.59 (0.30, 1.16)	-0.16 (.385)
CLASS D	672.4	218.0	454.4 (393.6, 515.2)	475.2 (416.2, 516.5)	0.60 (0.30, 1.20)	-1.00 (.385)
CLASS E & F	343.5	62.4	281.1 (223.6, 338.6)	292.7 (267.5, 317.2)	0.76 (0.39, 1.52)	-0.92 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: TEM-8A AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	480.9	333.5	147.4 (93.6, 201.2)	150.6 (123.8, 202.7)	0.47 (0.24, 0.93)	-0.88 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	372.7	192.1	180.6 (141.7, 219.5)	174.2 (147.2, 208.9)	1.79 (0.90, 3.55)	-0.88 (.385)
STATION 2	373.6	186.8	186.8 (141.0, 232.6)	212.0 (141.9, 221.9)	1.96 (0.99, 3.89)	-0.88 (.385)
STATION 3	252.8	241.0	11.8 (-49.9, 73.5)	21.6 (-0.9, 55.0)	0.38 (0.19, 0.76)	-0.44 (.385)
STATION 4	360.2	237.6	122.6 (69.8, 175.4)	99.6 (75.7, 142.7)	1.65 (0.83, 3.28)	-0.68 (.385)
STATION 5	177.1	98.7	78.4 (35.9, 120.9)	61.4 (30.9, 104.1)	2.44 (1.23, 4.85)	-0.52 (.385)
STATION 6	287.8	194.3	93.5 (58.8, 128.2)	106.3 (67.8, 129.3)	0.60 (0.30, 1.18)	-0.68 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	338.6	302.2	36.4 (-19.2, 92.0)	83.5 (14.8, 90.6)	0.41 (0.21, 0.81)	-0.36 (.385)
2.5 TO 5 M/SEC	445.5	243.3	202.2 (160.4, 244.0)	180.2 (164.2, 229.3)	1.30 (0.65, 2.57)	-0.96 (.385)
>5 M/SEC	316.0	84.4	231.6 (185.3, 277.9)	212.3 (185.0, 234.3)	3.65 (1.84, 7.23)	-0.96 (.385)
B. STABILITY GROUP						
CLASS A & B	263.8	268.7	-4.9 (-65.7, 55.9)	7.3 (-36.1, 53.0)	0.45 (0.23, 0.90)	-0.20 (.385)
CLASS C	364.3	255.8	108.5 (60.8, 156.2)	107.3 (63.6, 134.3)	1.88 (0.95, 3.73)	-0.68 (.385)
CLASS D	443.1	171.8	271.3 (228.0, 314.6)	255.8 (235.7, 302.9)	0.94 (0.47, 1.86)	-0.96 (.385)
CLASS E & F	217.9	17.9	200.0 (163.1, 236.9)	198.5 (155.1, 221.7)	5.30 (2.67, 10.51)	-0.96 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: TEM-8A AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias — Difference of Averages $C_O - C_p$ ($\mu g/m^3$)	Performance Measures: Bias — Difference of Medians $M_O - M_p$ ($\mu g/m^3$)	Performance Measures: Variance Comparison S_O^2/S_p^2	Performance Measures: Frequency Distribution Comparison $[f(C_O) - f(C_p)]$ max (fraction)
1. All stations/all events (A - 4a)	125.3	66.8	58.5 (±9.5)	57.3 (49.1, 65.0)	2.11 (1.06, 4.19)	-1.00 (.385)
2. By station/all events (A - 4b)						
Station 1	96.4	41.4	55.0 (±9.5)	53.3 (45.6, 62.5)	1.81 (.91, 3.58)	-1.00 (.385)
Station 2	84.8	38.7	46.1 (±15.9)	48.3 (36.1, 53.2)	.28 (.14, .56)	-.96 (.385)
Station 3	64.3	45.9	18.4 (±12.8)	14.6 (9.1, 22.6)	1.71 (.86, 3.39)	-.64 (.385)
Station 4	107.7	52.5	55.2 (±12.4)	49.3 (40.1, 63.0)	4.33 (2.18, 8.60)	-.96 (.385)
Station 5	40.1	15.2	24.9 (±8.2)	20.6 (15.1, 26.4)	5.80 (2.92, 11.51)	-.76 (.385)
Station 6	71.8	35.7	36.1 (±8.6)	36.0 (27.1, 45.1)	4.77 (2.41, 9.47)	-.84 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED
SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MULTIMAX AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	790.8	859.7	-68.9 (-167.8, 70.0)	-54.6 (-122.8, -2.2)	1.85 (0.93, 3.67)	0.36 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	508.9	476.1	32.8 (-33.8, 99.4)	69.2 (22.3, 92.0)	0.48 (0.24, 0.94)	-0.64 (.385)
STATION 2	535.0	645.3	-110.3 (-187.7, -32.9)	-103.9 (-160.1, -30.3)	0.45 (0.23, 0.90)	0.44 (.385)
STATION 3	580.0	690.3	-110.3 (-243.8, 23.2)	-135.3 (-208.3, -35.4)	1.65 (0.83, 3.27)	0.44 (.385)
STATION 4	550.0	506.5	43.5 (-22.7, 109.7)	33.3 (-23.8, 107.3)	1.60 (0.81, 3.17)	-0.28 (.385)
STATION 5	225.9	195.6	30.3 (-86.2, 146.8)	159.1 (45.6, 165.5)	0.09 (0.05, 0.18)	-0.64 (.385)
STATION 6	512.6	447.6	65.0 (-51.4, 181.4)	54.5 (-29.6, 121.5)	1.79 (0.90, 3.56)	-0.32 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	653.5	736.0	-82.5 (-179.9, 14.9)	-81.6 (-163.2, -31.4)	1.56 (0.79, 3.09)	0.44 (.385)
2.5 TO 5 M/SEC	652.0	729.1	-77.1 (-196.8, 42.6)	-58.8 (-124.3, -35.8)	1.72 (0.87, 3.41)	0.52 (.385)
>5 M/SEC	489.9	271.9	218.0 (162.1, 273.9)	164.5 (141.4, 249.0)	7.34 (3.70, 14.56)	-0.92 (.385)
B. STABILITY GROUP						
CLASS A & B	481.3	819.1	-337.8 (-426.1, -249.5)	-296.5 (-381.6, -254.4)	0.42 (0.21, 0.83)	0.92 (.385)
CLASS C	678.9	624.7	54.2 (-52.3, 160.7)	-24.4 (-55.5, 69.7)	7.27 (3.66, 14.42)	-0.28 (.385)
CLASS D	586.6	273.6	313.0 (276.2, 349.8)	275.1 (267.7, 337.8)	3.06 (1.54, 6.06)	-1.00 (.385)
CLASS E & F	398.0	227.7	170.3 (66.9, 273.7)	103.8 (46.9, 150.4)	31.60 (15.93, 62.68)	-0.64 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MULTIMAX AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	476.3	401.7	74.6 (17.6, 131.6)	77.1 (31.9, 116.0)	1.08 (0.55, 2.15)	-0.48 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	322.6	209.1	113.5 (74.3, 152.7)	115.7 (73.3, 144.1)	1.44 (0.73, 2.86)	-0.64 (.385)
STATION 2	286.6	287.2	-0.6 (-65.6, 64.4)	18.3 (-18.1, 59.7)	0.38 (0.19, 0.74)	-0.36 (.385)
STATION 3	315.9	285.2	30.7 (-40.4, 101.8)	-30.0 (-49.8, 56.7)	2.26 (1.14, 4.48)	-0.20 (.385)
STATION 4	313.3	226.4	86.9 (36.8, 137.0)	103.2 (49.1, 129.1)	1.23 (0.62, 2.44)	-0.60 (.385)
STATION 5	125.6	65.3	60.3 (11.2, 109.4)	94.3 (74.2, 108.8)	0.16 (0.08, 0.31)	-0.80 (.385)
STATION 6	257.9	161.9	96.0 (34.9, 157.1)	52.6 (17.3, 130.5)	1.97 (0.99, 3.90)	-0.52 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	316.2	275.4	40.8 (-26.3, 107.9)	59.4 (17.0, 89.4)	0.57 (0.29, 1.12)	-0.52 (.385)
2.5 TO 5 M/SEC	410.5	355.5	55.0 (2.4, 107.6)	58.1 (8.2, 92.7)	1.91 (0.96, 3.79)	-0.36 (.385)
>5 M/SEC	308.1	154.0	154.1 (102.0, 206.2)	111.4 (93.8, 160.0)	5.51 (2.78, 10.93)	-0.92 (.385)
B. STABILITY GROUP						
CLASS A & B	228.3	354.8	-126.1 (-195.7, -56.5)	-128.7 (-183.6, -77.7)	1.24 (0.62, 2.45)	0.64 (.385)
CLASS C	359.0	306.1	52.9 (-4.6, 110.4)	40.9 (1.9, 73.4)	2.39 (1.20, 4.74)	-0.36 (.385)
CLASS D	385.5	192.0	193.5 (155.1, 231.9)	179.6 (143.6, 218.3)	5.56 (2.80, 11.03)	-0.96 (.385)
CLASS E & F	196.9	100.0	96.9 (46.4, 147.4)	70.1 (43.4, 95.8)	5.91 (2.98, 11.72)	-0.68 (.385)

TABLE A. COMPARISON OF 25 HIGHRST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MULTIMAX AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias — Difference of Averages $\bar{C}_O - \bar{C}_p$ ($\mu g/m^3$)	Performance Measures: Bias — Difference of Medians $M_O - M_p$ ($\mu g/m^3$)	Performance Measures: Variance Comparison S_O^2/S_p^2	Performance Measures: Frequency Distribution Comparison $\lvert f(C_O) - f(C_p) \rvert$ max (fraction)
1. All stations/all events (A - 4a)	126.7	74.6	52.1 ($\pm$14.3)	44.3 (32.2, 60.5)	6.10 (3.08, 12.10)	-.96 (.385)
2. By station/all events (A - 4b)						
Station 1	97.4	38.2	59.2 ($\pm$14.4)	55.2 (43.1, 63.9)	5.44 (2.74, 10.80)	-.96 (.385)
Station 2	65.4	46.1	19.3 ($\pm$14.7)	20.5 (10.0, 27.1)	1.50 (.75, 2.97)	-.64 (.385)
Station 3	78.1	48.7	29.4 ($\pm$17.8)	22.0 (11.7, 35.2)	3.69 (1.86, 7.32)	-.52 (.385)
Station 4	84.5	49.4	35.1 ($\pm$9.6)	39.8 (24.8, 46.9)	1.63 (.82, 3.24)	-.80 (.385)
Station 5	34.9	10.1	24.8 ($\pm$8.2)	28.3 (24.2, 31.4)	.32 (.16, .64)	-.84 (.385)
Station 6	57.5	28.1	29.4 ($\pm$14.6)	19.5 (14.9, 35.2)	2.13 (1.07, 4.22)	-.72 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: MULTIMAX AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	771.8	891.6	-119.8 (-193.4, -46.2)	-103.1 (-161.6, -36.4)	0.29 (0.14, 0.57)	0.48 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	581.7	447.5	134.2 (79.6, 188.8)	113.8 (72.0, 181.1)	1.30 (0.66, 2.58)	-0.64 (.385)
STATION 2	658.9	586.0	72.9 (-15.1, 160.9)	110.1 (8.4, 169.4)	0.77 (0.39, 1.52)	-0.36 (.385)
STATION 3	450.2	767.1	-316.9 (-393.4, -240.4)	-286.1 (-404.9, -226.1)	0.43 (0.22, 0.86)	0.92 (.385)
STATION 4	546.7	560.7	-14.0 (-76.1, 48.1)	2.5 (-61.3, 52.4)	0.58 (0.29, 1.15)	-0.16 (.385)
STATION 5	321.3	188.9	132.4 (-4.4, 269.2)	156.6 (124.4, 227.8)	0.30 (0.15, 0.59)	-0.80 (.385)
STATION 6	496.8	524.0	-27.2 (-110.1, 55.7)	-37.5 (-81.5, 62.1)	0.28 (0.14, 0.56)	-0.32 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	668.9	822.9	-154.0 (-247.3, -60.7)	-123.9 (-219.8, -59.1)	0.50 (0.25, 0.99)	0.84 (.385)
2.5 TO 5 M/SEC	667.5	689.6	-22.1 (-93.2, 49.0)	3.7 (-56.0, 44.2)	0.52 (0.26, 1.03)	0.16 (.385)
>5 M/SEC	458.5	321.9	136.6 (62.8, 210.4)	139.3 (111.0, 166.2)	0.77 (0.39, 1.53)	-0.84 (.385)
B. STABILITY GROUP						
CLASS A & B	541.4	890.0	-348.6 (-434.8, -262.4)	-367.8 (-414.6, -275.5)	0.74 (0.37, 1.48)	0.84 (.385)
CLASS C	631.4	615.1	16.3 (-47.3, 79.9)	-22.7 (-75.5, 76.8)	7.11 (3.58, 14.11)	0.48 (.385)
CLASS D	672.4	272.7	399.7 (358.7, 440.7)	397.2 (351.2, 414.9)	5.28 (2.66, 10.47)	-1.00 (.385)
CLASS E & F	343.5	247.2	96.3 (52.8, 139.8)	75.6 (56.6, 107.7)	3.23 (1.63, 6.41)	-0.60 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: MULTIMAX AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	480.9	394.7	86.2 (42.0, 130.4)	84.4 (53.5, 127.4)	0.89 (0.45, 1.76)	-0.64 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	372.7	225.6	147.1 (106.2, 188.0)	159.2 (114.9, 176.6)	1.39 (0.70, 2.75)	-0.76 (.385)
STATION 2	373.6	230.0	143.6 (91.6, 195.6)	145.5 (96.9, 185.1)	1.05 (0.53, 2.09)	-0.80 (.385)
STATION 3	252.8	305.8	-53.0 (-109.3, 3.3)	-40.2 (-81.7, -1.1)	0.50 (0.25, 1.00)	0.32 (.385)
STATION 4	360.2	240.4	119.8 (72.3, 167.3)	89.5 (69.9, 131.9)	3.47 (1.75, 6.89)	-0.64 (.385)
STATION 5	177.1	72.3	104.8 (43.8, 165.8)	120.4 (88.1, 152.6)	0.53 (0.27, 1.05)	-0.80 (.385)
STATION 6	287.8	206.2	81.6 (31.7, 131.5)	110.2 (40.3, 150.0)	0.22 (0.11, 0.44)	-0.60 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	338.6	298.6	40.0 (-0.3, 80.3)	70.3 (1.2, 76.1)	1.22 (0.62, 2.43)	-0.36 (.385)
2.5 TO 5 M/SEC	445.5	380.3	65.2 (17.6, 112.8)	45.8 (30.7, 99.7)	0.77 (0.39, 1.53)	-0.60 (.385)
>5 M/SEC	316.0	169.0	147.0 (100.8, 193.2)	130.3 (99.3, 158.4)	3.69 (1.86, 7.33)	-0.80 (.385)
B. STABILITY GROUP						
CLASS A & B	263.8	357.3	-93.5 (-144.3, -42.7)	-99.2 (-139.0, -43.1)	0.80 (0.40, 1.59)	0.56 (.385)
CLASS C	364.3	319.4	44.9 (-2.5, 92.3)	38.8 (-2.5, 70.6)	1.93 (0.97, 3.83)	-0.32 (.385)
CLASS D	443.1	206.7	236.4 (203.4, 269.4)	218.0 (192.1, 252.9)	5.34 (2.69, 10.60)	-1.00 (.385)
CLASS E & F	217.9	111.6	106.3 (64.6, 148.0)	105.0 (72.2, 131.1)	1.87 (0.94, 3.71)	0.84 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: MULTIMAX AVERAGING TIME: 24 HOURS

Data Sets	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Difference of Averages $\bar{C}_O - \bar{C}_p$ ($\mu g/m^3$)	Performance Measures: Bias: Difference of Medians $M_O - M_p$ ($\mu g/m^3$)	Performance Measures: Variance Comparison S_O^2/S_p^2	Performance Measures: Frequency Distribution Comparison $\lvert f(C_O) - f(C_p) \rvert$ max (fraction)
1. All stations/all events (A - 4a)	125.3	84.7	40.6 ($\pm$13.4)	40.9 (34.9, 50.8)	.52 (.26, 1.04)	-.84 (.385)
2. By station/all events (A - 4b)						
Station 1	96.4	51.0	45.4 ($\pm$11.5)	52.4 (37.4, 56.5)	.80 (.40, 1.59)	-.84 (.385)
Station 2	84.8	41.6	43.2 ($\pm$10.9)	48.2 (34.9, 54.2)	.86 (.43, 1.70)	-.84 (.385)
Station 3	64.3	61.8	2.5 ($\pm$17.7)	-4.3 (-9.4, 16.7)	.50 (.25, .99)	-.36 (.385)
Station 4	107.7	58.2	49.5 ($\pm$12.5)	49.3 (33.7, 57.8)	4.04 (2.03, 8.01)	-.84 (.385)
Station 5	40.1	9.8	30.3 ($\pm$10.1)	32.1 (24.3, 34.3)	1.22 (.62, 2.42)	-.80 (.385)
Station 6	71.8	26.8	45.0 ($\pm$9.9)	48.1 (35.2, 54.5)	1.62 (.82, 3.21)	-.88 (.385)

APPENDIX B

Statistics for All Events

Appendix B: Statistics for All Events

In the tables which follow, model performance statistics are presented for all events with either the predicted or the observed concentration above a threshold value. As in the previous section, each table contains the results for one model, one calendar year of Clifty Creek data, and one averaging time. In each table, results are first presented based on comparisons of the highest observed and predicted concentration values event-by-event, regardless of location. Results are then presented for observed and predicted concentration values paired in time and location, including results for all stations combined, for each individual monitoring station, and for subsets of events based on meteorological conditions. As noted previously, subsets by meteorology were employed only for 1-hour and 3-hour averaging times.

In establishing the sets of observed and predicted concentration data, a small threshold concentration was used to eliminate events when neither the observed nor the predicted impact at a monitoring station were significant. The threshold value for 1-hour and 3-hour average concentrations was 25 $\mu g/m^3$. For 24-hour average values, the threshold was 5 $\mu g/m^3$.

Each table of results is presented in two parts, due to the large number of performance measures recommended for these data sets. One part provides results based on statistics appropriate to paired data. The other part gives results obtained for the same data sets using statistics appropriate for unpaired data. For logistical convenience, the latter results are presented as Part 1, and the former as Part 2.

In Part 1, the first column presents the number of events (or data pairs) in each data set. The second and third columns present, respectively, the average observed and average predicted concentration values. The fourth column presents

the difference between the observed and predicted averages, followed in parentheses by a 95 percent confidence interval calculated with a two-sample t test. The fifth column (variance comparison) presents the ratio of the observed variance divided by the predicted variance, with 95 percent confidence bounds in parentheses as calculated by an F test.

The frequency distribution comparison (sixth column) is equivalent to the performance measure previously described in Section A. The cumulative frequency distribution of observed values is compared to the distribution of predicted values. The maximum fractional difference is listed; a positive difference implies model overprediction. The value in parentheses is the maximum difference significant at a 95 percent confidence level, as given by the K-S test.

In Part 2, the number of events (i.e., data pairs) is repeated in the first column. The average difference between observed and predicted values is presented in the second column. In parentheses, the 95 percent confidence interval calculated with a one-sample t test is given. The confidence intervals are adjusted for the serial correlation of residual values, using the calculated lag-one autocorrelation coefficient. The confidence intervals were adjusted by a factor of $\left(\frac{1+r}{1-r}\right)^{1/2}$, where r represents the autocorrelation coefficient. For 1-hour average residuals, values of r ranged between +0.3 and +0.5. For 3-hour average residuals, r was generally less than 0.3 while for 24-hour average residuals, r was 0.2 or less. (No adjustment was made for subsets based on meteorological conditions, since the time sequence of events is disrupted by the selection process.)

The fraction of positive residuals is presented in the third column. This performance measure indicates the fraction of observed-predicted data pairs for which the observed concentration value is larger than the predicted value. In the fourth column, the variance of the residuals is presented, with 95 percent confidence bounds (from an F test) in parentheses. The gross variability of the residuals (i.e., the average squared residual) is given next, followed by the average absolute residual.

The Pearson correlation coefficient of observed and predicted concentration values is presented in the seventh column. In parentheses, 95 percent confidence bounds on the correlation coefficient are listed, as calculated with the Fisher z test. Finally, the frequency distribution of residual values is compared to a normal frequency distribution with the same mean and variance. The maximum difference between the actual distribution and the normal distribution is presented A positive difference indicates that the fraction of residuals less than or equal to a given value is larger than the fraction of residuals at that same values for the normal distribution. In parentheses, the maximum difference significant at a 95 percent confidence level (as given by the K-S test) is listed.

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1576	115.1	80.2	34.9 ($\pm$7.1)	0.51 (0.46, 0.56)	-0.62 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5561	93.2	56.7	36.5 ($\pm$4.9)	0.55 (0.50, 0.61)	-0.66 (.026)
3. All concentrations, by station (B-1)						
Station 1	1357	95.3	53.1	42.2 ($\pm$6.1)	0.75 (0.68, 0.82)	-0.60 (.037)
Station 2	825	102.9	77.2	25.7 ($\pm$10.8)	0.40 (0.36, 0.44)	-0.64 (.047)
Station 3	1037	92.0	56.7	35.3 ($\pm$ 9.1)	0.45 (0.40, 0.50)	-0.74 (.042)
Station 4	995	100.1	93.3	6.8 ($\pm$ 8.6)	0.57 (0.52, 0.64)	-0.36 (.043)
Station 5	694	59.6	13.5	46.1 ($\pm$5.8)	0.26 (0.23, 0.29)	-0.94 (.052)
Station 6	653	103.5	28.2	75.3 ($\pm$ 8.7)	1.50 (1.34, 1.67)	-0.84 (.053)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
$\leq$2.5 m/sec	2271	88.3	44.9	43.4 ($\pm$5.2)	0.60 (0.55, 0.67)	-0.75 (.029)
2.5 to 5 m/sec	2819	91.2	59.2	32.0 ($\pm$4.8)	0.49 (0.44, 0.54)	-0.63 (.026)
>5 m/sec	471	128.3	98.5	29.8 ($\pm$13.8)	0.69 (0.61, 0.78)	-0.43 (.063)
b. Stability Group						
Class A & B	565	101.9	136.9	-35.0 ($\pm$16.5)	0.24 (0.21, 0.27)	-0.48 (.057)
Class C	974	111.4	116.9	-5.5 ($\pm$11.6)	0.42 (0.38, 0.46)	-0.47 (.044)
Class D	2899	98.5	34.5	64.0 ($\pm$3.6)	1.22 (1.11, 1.34)	-0.72 (.025)
Class E & F	1123	59.2	21.3	37.9 ($\pm$4.4)	1.47 (1.33, 1.63)	-0.70 (.041)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_O - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_O > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3576	34.9 (± 9.7)	0.79	38870 (37134, 40742)	40079	131.0	0.18 (0.15, 0.21)	-0.24 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5561	36.5 (± 6.7)	0.82	33407 (32202, 34688)	34731	118.0	0.03 (0.00, 0.06)	-0.27 (.026)
3. All concentrations, by station (B-1)								
Station 1	1357	42.2 (±14.4)	0.80	29136 (27070, 31472)	30891	122.0	-0.09 (-0.14, -0.04)	-0.29 (.052)
Station 2	825	25.6 (±18.7)	0.81	46163 (42033, 50998)	46765	134.9	0.09 (0.02, 0.15)	-0.29 (.067)
Station 3	1037	35.3 (±17.3)	0.85	42557 (39134, 46496)	43762	118.9	0.05 (-0.01, 0.11)	-0.31 (.060)
Station 4	995	6.8 (±16.8)	0.65	38882 (35694, 42562)	38889	137.9	-0.02 (-0.08, 0.04)	-0.16 (.061)
Station 5	694	46.1 (± 8.5)	0.97	10651 (9619, 11877)	12757	66.7	0.14 (0.06, 0.21)	-0.38 (.073)
Station 6	653	75.3 (±18.2)	0.91	24556 (22109, 27478)	30185	111.9	0.06 (-0.02, 0.13)	-0.27 (.075)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	2271	43.4 (± 9.8)	0.86	31190 (29458, 33094)	33061	113.4	0.02 (-0.02, 0.06)	-0.30 (.040)
2.5 to 5 m/sec	2819	32.0 (± 9.4)	0.80	32743 (31103, 34528)	33754	114.7	0.04 (0.00, 0.07)	-0.26 (.036)
>5 m/sec	471	29.8 (±31.4)	0.71	47845 (42310, 54665)	48632	160.5	-0.02 (0.11, 0.07)	-0.18 (.089)
b. Stability Group								
Class A & B	565	-34.9 (±29.4)	0.68	75813 (67739, 85582)	76897	176.0	-0.07 (-0.02, 0.15)	-0.24 (.081)
Class C	974	- 5.5 (±22.0)	0.69	70926 (65052, 77717)	70883	172.2	-0.05 (-0.11, 0.02)	-0.21 (.062)
Class D	2899	63.9 (± 7.2)	0.86	18288 (17384, 19271)	22309	105.6	0.05 (0.01, 0.09)	-0.23 (.036)
Class E & F	1123	37.9 (±10.6)	0.88	12805 (11813, 13941)	14230	74.3	-0.12 (-0.18, -0.06)	-0.31 (.057)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1271	94.8	65.3	29.5 (±8.0)	0.65 (0.58, 0.72)	-0.54 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2139	76.3	47.5	28.8 (±5.3)	0.70 (0.63, 0.78)	-0.56 (.042)
3. All concentrations, by station (B-1)						
Station 1	532	78.5	44.3	34.2 (± 9.6)	0.98 (0.86, 1.13)	-0.49 (.083)
Station 2	335	80.0	62.4	17.6 (±12.8)	0.49 (0.40, 0.60)	-0.53 (.105)
Station 3	396	76.5	47.5	29.0 (±13.8)	0.58 (0.48, 0.70)	-0.67 (.097)
Station 4	398	78.8	73.7	5.1 (±12.5)	0.79 (0.66, 0.95)	-0.21 (.096)
Station 5	231	52.2	13.3	38.9 (± 9.3)	0.30 (0.24, 0.37)	-0.92 (.127)
Station 6	247	85.1	24.1	61.0 (±13.2)	1.83 (1.46, 2.28)	-0.81 (.122)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	595	73.4	33.0	40.4 (± 9.2)	0.87 (0.76, 1.00)	-0.64 (.079)
2.5 to 5 m/sec	1269	73.4	49.5	23.9 (±6.8)	0.61 (0.55, 0.68)	-0.55 (.054)
>5 m/sec	275	95.9	69.8	26.1 (±16.6)	0.88 (0.70, 1.09)	-0.42 (.116)
b. Stability Group						
Class A & B	203	76.1	103.7	-27.6 (±23.4)	0.37 (0.29, 0.46)	-0.33 (.135)
Class C	408	90.5	78.5	12.0 (±15.5)	0.57 (0.48, 0.69)	-0.42 (.095)
Class D	1162	78.8	36.1	42.7 (±6.0)	1.07 (0.96, 1.20)	-0.61 (.056)
Class E & F	366	52.9	18.1	34.8 (±7.9)	1.63 (1.34, 1.98)	-0.71 (.101)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1271	29.5 (±9.2)	0.74	15307 (14188, 16578)	16164	90.9	0.28 (0.23, 0.33)	-0.19 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2139	28.8 (±6.5)	0.76	14070 (13266, 14957)	14893	86.3	0.09 (0.04, 0.13)	-0.21 (.042)
3. All concentrations, by station (B-1)								
Station 1	532	34.2 (±14.3)	0.73	13896 (12375, 15747)	15041	90.7	-0.09 (-0.17, 0.00)	-0.16 (.083)
Station 2	335	17.5 (±16.1)	0.75	17518 (15156, 20544)	17773	90.7	0.18 (0.08, 0.29)	-0.23 (.105)
Station 3	396	28.9 (±16.6)	0.81	17933 (15690, 20751)	18725	90.6	0.09 (-0.01, 0.19)	-0.03 (.097)
Station 4	398	5.1 (±14.5)	0.56	14620 (12795, 16911)	14608	91.8	0.10 (0.00, 0.19)	-0.07 (.096)
Station 5	231	38.9 (±10.6)	0.95	4302 (3619, 5223)	5794	55.0	0.20 (0.07, 0.32)	-0.35 (.127)
Station 6	247	61.1 (±18.2)	0.89	9801 (8290, 11819)	13491	84.5	0.12 (0.00, 0.24)	-0.22 (.122)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	595	40.4 (±11.1)	0.81	12293 (11014, 13832)	13906	84.3	0.06 (-0.02, 0.14)	-0.22 (.079)
2.5 to 5 m/sec	1269	24.0 (± 8.7)	0.75	14252 (13209, 15436)	14815	84.9	0.07 (0.01, 0.12)	-0.22 (.054)
>5 m/sec	275	26.1 (±19.9)	0.69	16768 (14301, 20012)	17386	97.1	0.15 (0.03, 0.26)	-0.14 (.116)
b. Stability Group								
Class A & B	203	-27.6 (±24.8)	0.59	25432 (21161, 31311)	26067	113.2	0.13 (-0.01, 0.26)	-0.16 (.135)
Class C	408	12.0 (±18.6)	0.65	24912 (21837, 28761)	24995	112.2	0.02 (-0.07, 0.12)	-0.16 (.095)
Class D	1162	42.7 (± 7.6)	0.80	9795 (9048, 10648)	11606	80.3	0.11 (0.05, 0.16)	-0.19 (.056)
Class E & F	366	34.8 (±12.2)	0.84	6673 (5808, 7769)	7867	61.7	-0.13 (-0.23, -0.02)	-0.26 (.101)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	335	38.5	25.0	13.5 (±16.7)	0.90 (0.50, 1.63)	-0.46 (.332)
2. All concentrations, all stations (paired in time and location) (B-5)	1115	22.6	11.7	10.9 (±2.0)	1.11 (0.99, 1.24)	-0.62 (.058)
3. All concentrations, by station (B-1)						
Station 1	211	29.0	13.9	15.1 (±5.2)	2.00 (1.59, 2.51)	-0.44 (.132)
Station 2	184	21.5	14.0	7.5 (±5.0)	0.72 (0.57, 0.93)	-0.55 (.142)
Station 3	194	24.4	12.9	11.5 (±5.4)	0.95 (0.75, 1.20)	-0.70 (.138)
Station 4	187	24.7	20.4	4.3 (±5.8)	0.88 (0.69, 1.12)	-0.39 (.141)
Station 5	206	13.7	1.9	11.8 (±1.9)	0.89 (0.70, 1.12)	-0.94 (.134)
Station 6	133	22.2	5.7	16.5 (±4.6)	2.57 (1.92, 3.44)	-0.77 (.167)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability ($\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[t(d) - t_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	335	13.5 (±4.4)	0.76	1236 (1069, 1450)	1414	27.3	0.48 (0.39, 0.56)	-0.12 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1115	10.9 (±2.0)	0.81	780 (719, 849)	899	20.2	0.34 (0.28, 0.39)	-0.18 (.058)
3. All concentrations, by station (B-1)								
Station 1	211	15.0 (±6.4)	0.75	1271 (1061, 1558)	1491	26.4	0.14 (0.01, 0.27)	0.12 (.132)
Station 2	184	7.5 (±3.9)	0.79	630 (520, 784)	682	18.7	0.48 (0.36, 0.58)	-0.21 (.142)
Station 3	194	11.5 (±5.6)	0.81	1057 (876, 1308)	1183	22.5	0.28 (0.14, 0.40)	-0.21 (.138)
Station 4	187	4.3 (±4.4)	0.66	823 (680, 1023)	838	19.4	0.49 (0.37, 0.59)	0.15 (.141)
Station 5	206	11.8 (±1.8)	0.97	129 (107, 159)	267	13.4	0.35 (0.22, 0.46)	-0.25 (.134)
Station 6	103	16.4 (±5.0)	0.88	645 (515, 838)	910	21.1	0.11 (-0.06, 0.27)	-0.16 (.167)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4127	127.7	81.8	45.9 (±6.7)	0.55 (0.50, 0.61)	-0.60 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6523	99.1	57.4	41.8 (±4.5)	0.61 (0.55, 0.67)	-0.63 (.024)
3. All concentrations, by station (B-1)						
Station 1	1515	100.0	57.4	42.6 (±8.7)	0.94 (0.84, 1.05)	-0.60 (.049)
Station 2	1202	102.9	44.0	58.9 (±10.7)	0.86 (0.77, 0.96)	-0.75 (.055)
Station 3	1114	85.9	74.1	11.8 (±13.2)	0.21 (0.19, 0.24)	-0.60 (.058)
Station 4	1331	102.4	91.4	11.0 (±10.4)	0.64 (0.57, 0.72)	-0.35 (.053)
Station 5	485	78.2	19.2	59.0 (±12.3)	0.63 (0.54, 0.73)	-0.91 (.087)
Station 6	876	115.9	23.8	92.1 (±9.8)	1.17 (1.02, 1.33)	-0.89 (.065)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	2184	92.0	53.2	38.9 (±8.0)	0.53 (0.48, 0.59)	-0.71 (.041)
2.5 to 5 m/sec	3873	100.7	54.1	46.6 (±5.6)	0.69 (0.63, 0.76)	-0.61 (.031)
>5 m/sec	466	119.1	104.0	15.1 (±20.0)	0.47 (0.40, 0.55)	-0.35 (.089)
b. Stability Group						
Class A & B	544	113.2	141.2	-28.0 (±24.9)	0.23 (0.20, 0.26)	-0.43 (.082)
Class C	1229	111.1	118.0	-6.9 (±14.2)	0.37 (0.33, 0.41)	-0.46 (.055)
Class D	3513	107.0	36.4	70.6 (±4.8)	1.65 (1.50, 1.82)	-0.66 (.032)
Class E & F	1237	58.6	19.7	38.9 (±5.2)	0.84 (0.75, 0.94)	-0.81 (.055)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4127	45.9 (±8.9)	0.78	39877 (38215, 41660)	41976	139.4	0.17 (0.14, 0.20)	-0.22 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6523	41.8 (±6.9)	0.80	36082 (34877, 37356)	37822	127.2	-0.04 (-0.06, -0.02)	-0.25 (.024)
3. All concentrations, by station (B-1)								
Station 1	1515	42.6 (±15.8)	0.78	33402 (31154, 35927)	35197	131.5	-0.11 (-0.16, -0.06)	-0.22 (.049)
Station 2	1202	58.9 (±14.6)	0.87	35717 (33036, 38772)	39158	122.3	-0.01 (-0.07, 0.05)	-0.29 (.055)
Station 3	1114	11.8 (±19.2)	0.78	50767 (46818, 55289)	50860	129.4	-0.01 (-0.07, 0.05)	-0.27 (.058)
Station 4	1331	11.0 (±17.0)	0.64	41163 (38218, 44497)	41253	143.6	-0.10 (-0.15, -0.05)	-0.14 (.053)
Station 5	485	59.0 (±13.4)	0.95	16558 (14668, 18880)	20007	86.3	0.14 (0.05, 0.23)	-0.34 (.087)
Station 6	876	92.1 (±12.1)	0.93	20138 (18386, 22180)	28596	121.7	0.08 (0.01, 0.15)	-0.25 (.065)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	2184	38.9 (±11.5)	0.83	38587 (36404, 40792)	40079	125.1	-0.05 (-0.09, -0.01)	-0.30 (.041)
2.5 to 5 m/sec	3873	46.6 (±9.0)	0.80	33071 (31650, 34599)	35263	125.4	-0.03 (-0.06, 0.00)	-0.23 (.031)
>5 m/sec	466	15.1 (±30.1)	0.65	48609 (42959, 55580)	48734	152.5	-0.03 (-0.12, 0.06)	-0.14 (.089)
b. Stability Group								
Class A & B	544	-28.0 (±35.0)	0.66	91880 (81925, 103970)	92494	200.0	-0.06 (-0.14, 0.02)	-0.22 (.082)
Class C	1229	-6.9 (±21.7)	0.68	70489 (65253, 76446)	70480	178.3	-0.10 (-0.16, -0.04)	-0.21 (.055)
Class D	3513	70.6 (±7.6)	0.83	22088 (21093, 23162)	27068	116.9	-0.03 (-0.06, 0.00)	-0.19 (.032)
Class E & F	1237	38.9 (±9.4)	0.89	10366 (9598, 11239)	11874	74.1	-0.18 (-0.23, -0.13)	-0.33 (.055)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1478	105.6	66.0	39.5 ($\pm$7.5)	0.72 (0.64, 0.81)	-0.54 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2525	81.6	48.2	33.5 ($\pm$4.9)	0.80 (0.72, 0.89)	-0.52 (.038)
3. All concentrations, by station (B-1)						
Station 1	598	81.8	47.7	34.1 ($\pm$9.9)	1.20 (1.04, 1.38)	-0.48 (.079)
Station 2	460	86.7	37.4	49.3 ($\pm$11.4)	1.13 (0.97, 1.32)	-0.68 (.090)
Station 3	428	70.8	63.3	7.6 ($\pm$13.8)	0.25 (0.21, 0.30)	-0.52 (.093)
Station 4	526	82.6	73.9	8.7 ($\pm$11.2)	1.01 (0.88, 1.16)	-0.25 (.084)
Station 5	172	66.0	17.9	48.1 ($\pm$14.2)	0.76 (0.59, 0.98)	-0.86 (.147)
Station 6	341	94.5	20.2	74.4 ($\pm$10.5)	1.46 (1.13, 1.88)	-0.84 (.104)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	591	76.0	42.6	33.4 ($\pm$9.9)	0.76 (0.66, 0.87)	-0.60 (.079)
2.5 to 5 m/sec	1533	81.5	46.8	34.7 ($\pm$6.4)	0.80 (0.71, 0.90)	-0.55 (.049)
>5 m/sec	401	90.5	61.8	28.7 ($\pm$12.3)	0.87 (0.73, 1.04)	-0.41 (.096)
b. Stability Group						
Class A & B	209	89.6	101.7	-12.1 ($\pm$24.3)	0.35 (0.28, 0.44)	-0.37 (.133)
Class C	476	87.0	80.7	6.3 ($\pm$14.0)	0.55 (0.47, 0.64)	-0.38 (.088)
Class D	1394	87.9	39.4	48.5 ($\pm$5.9)	1.43 (1.28, 1.60)	-0.56 (.052)
Class E & F	446	52.7	16.0	36.6 ($\pm$6.6)	1.14 (0.97, 1.35)	-0.77 (.091)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1478	39.5 (±8.7)	0.75	16486 (15363, 17748)	18037	97.8	0.24 (0.19, 0.29)	-0.17 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2525	33.5 (±6.6)	0.75	16400 (15534, 17347)	17513	94.4	-0.02 (-0.06, 0.02)	-0.19 (.038)
3. All concentrations, by station (B-1)								
Station 1	598	34.1 (±15.2)	0.71	17567 (15744, 19761)	18698	100.2	-0.15 (-0.23, -0.07)	-0.16 (.079)
Station 2	460	49.3 (±12.6)	0.84	14856 (13119, 17002)	17249	91.7	0.05 (-0.04, 0.14)	-0.22 (.090)
Station 3	428	7.6 (±20.1)	0.72	21641 (19027, 24896)	21648	97.0	-0.03 (-0.12, 0.07)	-0.23 (.093)
Station 4	526	8.7 (±14.8)	0.56	18280 (16269, 20731)	18321	98.9	-0.07 (-0.15, 0.02)	0.09 (.084)
Station 5	172	48.1 (±11.4)	0.91	6357 (5211, 7980)	8634	67.6	0.29 (0.15, 0.42)	-0.29 (.147)
Station 6	341	74.4 (±11.2)	0.93	8322 (7209, 9745)	13831	91.5	0.16 (0.05, 0.26)	0.21 (.104)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	591	33.4 (±12.7)	0.78	16306 (14605, 18356)	17393	94.3	-0.07 (-0.15, 0.01)	-0.23 (.079)
2.5 to 5 m/sec	1533	34.7 (±8.8)	0.75	16537 (15430, 17779)	17731	94.2	-0.02 (-0.07, 0.03)	-0.19 (.049)
>5 m/sec	401	28.7 (±17.1)	0.68	16069 (14070, 18576)	16835	95.5	-0.02 (-0.12, 0.08)	-0.11 (.096)
b. Stability Group								
Class A & B	209	-12.1 (±31.3)	0.60	32695 (27273, 40123)	32684	130.4	-0.02 (-0.16, 0.12)	-0.15 (.133)
Class C	476	6.3 (±19.4)	0.64	25801 (22831, 29457)	25787	115.7	-0.07 (-0.16, 0.02)	-0.17 (.088)
Class D	1394	48.5 (±8.0)	0.77	13282 (12352, 14332)	15628	91.9	-0.04 (-0.09, 0.01)	-0.15 (.052)
Class E & F	446	36.6 (±9.4)	0.87	6135 (5408, 7037)	7464	62.9	-0.21 (-0.30, -0.12)	-0.28 (.091)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	46.0	28.0	18.0 ($\pm$5.2)	0.79 (0.65, 0.96)	-0.41 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1165	26.2	13.5	12.7 ($\pm$2.1)	1.05 (0.94, 1.18)	-0.56 (.056)
3. All concentrations, by station (B-1)						
Station 1	245	28.7	14.9	13.7 ($\pm$4.8)	1.32 (1.06, 1.65)	-0.50 (.123)
Station 2	233	26.3	9.5	16.8 ($\pm$4.1)	1.65 (1.32, 2.06)	-0.65 (.126)
Station 3	188	23.9	18.0	5.8 ($\pm$5.9)	0.36 (0.28, 0.46)	-0.54 (.140)
Station 4	215	29.5	24.3	5.2 ($\pm$6.2)	1.21 (0.96, 1.52)	-0.29 (.131)
Station 5	122	15.8	3.2	12.6 ($\pm$3.5)	1.66 (1.23, 2.24)	-0.87 (.174)
Station 6	162	28.3	5.0	23.3 ($\pm$4.0)	3.91 (2.98, 5.12)	-0.77 (.151)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	18.0 (±4.0)	0.78	1314 (1141, 1534)	1634	29.9	0.49 (0.41, 0.57)	-0.11 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1165	12.7 (±2.1)	0.80	962 (889, 1046)	1123	23.2	0.29 (0.24, 0.34)	-0.17 (.056)
3. All concentrations, by station (B-1)								
Station 1	245	13.7 (±5.2)	0.76	1251 (1057, 1510)	1434	26.2	0.14 (0.01, 0.26)	0.13 (.123)
Station 2	233	16.8 (±3.8)	0.88	675 (568, 819)	953	22.3	0.34 (0.22, 0.45)	-0.16 (.126)
Station 3	188	5.8 (±6.4)	0.76	1411 (1166, 1752)	1438	25.4	0.17 (0.03, 0.31)	-0.23 (.140)
Station 4	215	5.2 (±4.6)	0.64	1094 (915, 1338)	1115	22.5	0.49 (0.38, 0.59)	0.13 (.131)
Station 5	122	12.6 (±2.5)	0.92	187 (148, 246)	345	13.7	0.52 (0.38, 0.64)	-0.20 (.174)
Station 6	162	23.3 (±3.9)	0.92	588 (479, 744)	1126	25.4	0.16 (0.01, 0.31)	-0.13 (.151)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3643	113.1	82.1	31.0 ($\pm$12.9)	0.50 (0.45, 0.55)	-0.54 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5681	91.3	58.1	33.2 ($\pm$4.8)	0.54 (0.49, 0.60)	-0.59 (.026)
3. All concentrations, by station (B-1)						
Station 1	1344	96.2	44.3	51.9 ($\pm$7.9)	1.10 (0.98, 12.3)	-0.63 (.052)
Station 2	863	98.5	68.8	29.7 ($\pm$13.2)	0.56 (0.49, 0.63)	-0.53 (.065)
Station 3	1080	88.7	78.0	10.7 ($\pm$14.2)	0.32 (0.28, 0.35)	-0.61 (.059)
Station 4	998	99.7	79.9	19.8 ($\pm$10.9)	0.82 (0.73, 0.91)	-0.34 (.061)
Station 5	698	59.3	28.9	30.4 ($\pm$12.8)	0.09 (0.08, 0.10)	-0.91 (.073)
Station 6	698	97.1	38.4	58.7 ($\pm$11.9)	1.41 (1.24, 1.61)	-0.65 (.073)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	2395	84.0	69.1	14.9 ($\pm$8.8)	0.32 (0.29, 0.35)	-0.60 (.039)
2.5 to 5 m/sec	2807	91.6	47.3	44.3 ($\pm$5.7)	0.88 (0.80, 0.96)	-0.62 (.036)
>5 m/sec	479	126.3	66.4	59.9 ($\pm$15.1)	2.04 (1.77, 2.34)	-0.36 (.088)
b. Stability Group						
Class A & B	594	97.1	150.5	-53.3 ($\pm$24.5)	0.19 (0.17, 0.22)	-0.36 (.079)
Class C	1014	107.3	130.4	-23.2 ($\pm$16.4)	0.39 (0.35, 0.44)	-0.39 (.060)
Class D	3056	93.7	35.1	58.6 ($\pm$4.4)	2.19 (1.99, 2.41)	-0.58 (.035)
Class E & F	1017	64.8	1.1	63.7 ($\pm$5.3)	70.6 (63.0, 79.1)	-0.98 (.060)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3643	31.0 (±10.0)	0.76	40618 (38826, 42557)	41566	125.4	0.15 (0.12, 0.18)	-0.22 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5681	33.2 (±6.9)	0.79	33868 (32658, 35158)	34966	114.2	0.02 (-0.01, 0.05)	-0.24 (.026)
3. All concentrations, by station (B-1)								
Station 1	1344	51.9 (±13.0)	0.80	23975 (22267, 24427)	26650	115.7	-0.10 (-0.15, -0.05)	-0.22 (.052)
Station 2	863	29.7 (±10.6)	0.76	38431 (35063, 42359)	39268	124.0	0.02 (-0.05, 0.09)	-0.23 (.065)
Station 3	1080	10.7 (±14.7)	0.79	51887 (47792, 56586)	51952	124.6	0.09 (0.03, 0.15)	-0.28 (.059)
Station 4	998	19.8 (±10.5)	0.66	31223 (28666, 34173)	31593	124.5	-0.01 (-0.07, 0.05)	-0.13 (.061)
Station 5	698	30.4 (±12.6)	0.94	28190 (25465, 31424)	29071	75.9	0.11 (0.04, 0.18)	-0.42 (.073)
Station 6	698	58.7 (±14.3)	0.83	26689 (24109, 29750)	30098	106.9	-0.31 (-0.38, -0.24)	-0.21 (.073)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	2395	14.9 (±12.3)	0.78	47920 (45325, 50765)	48123	124.7	0.00 (-0.04, 0.04)	-0.28 (.039)
2.5 to 5 m/sec	2807	44.2 (±7.9)	0.81	22298 (21179, 23516)	24251	102.4	-0.07 (-0.11, -0.03)	-0.22 (.036)
>5 m/sec	479	59.9 (±24.5)	0.71	28439 (25174, 32455)	31976	131.0	0.00 (-0.09, 0.09)	-0.10 (.088)
b. Stability Group								
Class A & B	594	-53.4 (±35.3)	0.62	89292 (79998, 100484)	91989	178.9	0.05 (-0.03, 0.13)	-0.19 (.079)
Class C	1014	-23.2 (±21.4)	0.64	74924 (68832, 89558)	1788	177.3	-0.07 (-0.13, -0.01)	-0.18 (.060)
Class D	3056	58.6 (±6.2)	0.81	14886 (14168, 15664)	18317	97.1	0.02 (-0.02, 0.06)	-0.16 (.035)
Class E & F	1017	63.7 (±8.4)	0.99	7333 (6737, 8018)	11389	64.8	-0.02 (-0.08, 0.04)	-0.31 (.060)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1290	93.4	65.3	28.1 (±7.9)	0.65 (0.58, 0.73)	-0.47 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2178	75.1	48.8	26.3 (±5.2)	0.70 (0.64, 0.77)	-0.48 (.041)
3. All concentrations, by station (B-1)						
Station 1	518	80.6	37.3	43.3 (±8.9)	1.49 (1.30, 1.71)	-0.53 (.085)
Station 2	353	76.1	54.5	21.6 (±12.8)	0.83 (0.68, 1.01)	-0.41 (.102)
Station 3	409	74.2	66.9	7.3 (±15.3)	0.40 (0.33, 0.48)	-0.55 (.095)
Station 4	400	78.5	62.9	15.6 (±11.0)	1.27 (1.06, 1.52)	-0.20 (.096)
Station 5	238	50.8	28.2	22.6 (±16.1)	0.08 (0.06, 0.10)	-0.84 (.125)
Station 6	260	81.0	32.6	48.4 (±12.7)	1.87 (1.50, 2.34)	-0.63 (.119)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	631	69.7	58.4	11.3 (±3.0)	0.38 (0.30, 0.47)	-0.47 (.077)
2.5 to 5 m/sec	1265	73.6	43.9	29.7 (±6.2)	0.86 (0.77, 0.97)	-0.54 (.054)
>5 m/sec	282	93.6	49.1	44.6 (±13.2)	2.47 (2.21, 2.77)	-0.33 (.115)
b. Stability Group						
Class A & B	209	74.2	107.7	-33.5 (±21.0)	0.47 (0.37, 0.59)	-0.22 (.133)
Class C	429	86.4	98.4	-12.0 (±17.0)	0.40 (0.35, 0.46)	-0.29 (.093)
Class D	1212	75.8	33.5	42.2 (±5.2)	1.94 (1.73, 2.17)	-0.50 (.055)
Class E & F	328	58.3	2.8	55.5 (±6.8)	31.1 (25.3, 38.3)	-0.93 (.106)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability ($\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1290	28.1 (±9.1)	0.18	16464 (15279, 17847)	17242	87.7	0.22 (0.17, 0.27)	-0.18 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2178	26.3 (±6.5)	0.74	14526 (13703, 15432)	15210	83.8	0.05 (0.01, 0.09)	-0.19 (.041)
3. All concentrations, by station (B-1)								
Station 1	518	43.3 (±[illegible])	0.76	11422 (10156, 12966)	13276	86.4	-0.08 (-0.17, 0.01)	-0.15 (.085)
Station 2	353	21.6 (±14.8)	0.71	13559 (11773, 15832)	13986	83.1	0.10 (0.00, 0.20)	-0.17 (.102)
Station 3	409	7.3 (±19.8)	0.76	22928 (20101, 26465)	22926	95.8	0.09 (-0.01, 0.19)	-0.26 (.095)
Station 4	400	15.6 (±12.8)	0.59	11707 (10249, 13535)	11920	82.7	0.08 (-0.02, 0.18)	-0.06 (.096)
Station 5	238	22.6 (±16.2)	0.90	15216 (12831, 18418)	15664	63.1	0.09 (-0.04, 0.21)	-0.38 (.125)
Station 6	260	48.4 (±17.9)	0.82	10932 (9283, 13117)	13230	81.3	0.00 (-0.10, 0.14)	-0.17 (.119)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	631	11.3 (±13.7)	0.71	21911 (19692, 24567)	22004	93.7	-0.01 (-0.09, 0.07)	-0.21 (.077)
2.5 to 5 m/sec	1265	29.7 (±8.0)	0.76	11528 (10683, 12487)	330488	79.2	0.08 (0.02, 0.13)	-0.19 (.054)
>5 m/sec	282	44.6 (±15.1)	0.73	10661 (9110, 12693)	436921	82.8	0.19 (0.07, 0.30)	-0.10 (.115)
b. Stability Group								
Class A & B	209	-33.6 (±22.9)	0.52	23391 (19512, 28705)	24405	114.5	0.03 (-0.11, 0.17)	-0.12 (.133)
Class C	429	-12.0 (±20.5)	0.59	32283 (28387, 37131)	32353	118.4	-0.01 (-0.10, 0.08)	-0.14 (.093)
Class D	1212	42.2 (±6.5)	0.77	7971 (7375, 8650)	9750	73.3	0.07 (0.01, 0.13)	-0.13 (.055)
Class E & F	328	55.5 (±9.7)	0.97	4035 (3486, 4740)	7104	57.8	-0.07 (-0.18, 0.04)	-0.26 (.106)

TABLE B. (PART I) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[F(C_o) - F(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	337	38.3	25.0	13.3 ($\pm$4.9)	1.10 (0.90, 1.35)	-0.37 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1126	22.4	12.1	10.3 ($\pm$1.9)	1.28 (1.15, 1.44)	-0.53 (.057)
3. All concentrations, by station (B-1)						
Station 1	207	29.5	12.0	17.5 ($\pm$4.9)	3.35 (2.66, 4.21)	-0.43 (.134)
Station 2	188	21.1	12.8	8.3 ($\pm$4.4)	1.14 (0.90, 1.46)	-0.43 (.140)
Station 3	196	24.1	17.6	6.5 ($\pm$5.8)	0.71 (0.56, 0.90)	-0.55 (.137)
Station 4	187	24.7	17.5	7.2 ($\pm$5.0)	1.62 (1.27, 2.07)	-0.33 (.141)
Station 5	210	13.5	4.1	9.4 ($\pm$2.7)	0.31 (0.24, 0.39)	-0.88 (.133)
Station 6	138	21.4	8.1	13.3 ($\pm$4.4)	2.74 (2.06, 3.64)	-0.56 (.164)

TABLE B. (PART I) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons		
				Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	337	38.3	25.0	13.3 (±4.9)	1.10 (0.90, 1.35)	-0.37 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1126	22.4	12.1	10.3 (±1.9)	1.28 (1.15, 1.44)	-0.53 (.057)
3. All concentrations, by station (B-1)						
Station 1	207	29.5	12.0	17.5 (±4.9)	3.35 (2.66, 4.21)	-0.43 (.134)
Station 2	188	21.1	12.8	8.3 (±4.4)	1.14 (0.90, 1.46)	-0.43 (.140)
Station 3	196	24.1	17.6	6.5 (±5.8)	0.71 (0.56, 0.90)	-0.55 (.137)
Station 4	187	24.7	17.5	7.2 (±5.0)	1.62 (1.27, 2.07)	-0.33 (.141)
Station 5	210	13.5	4.1	9.4 (±2.7)	0.31 (0.24, 0.39)	-0.88 (.133)
Station 6	138	21.4	8.1	13.3 (±4.4)	2.74 (2.06, 3.64)	-0.56 (.164)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $\lvert f(d) - f_n \rvert$ max (fraction)
1. Highest concentration, event-by-event (A-1)	337	13.3 (±4.3)	0.74	1171 (1014, 1373)	1344	25.8	0.45 (0.37, 0.54)	0.12 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1126	10.3 (±2.0)	0.00	750 (692, 816)	855	19.5	0.32 (0.26, 0.37)	-0.16 (.057)
3. All concentrations, by station (B-1)								
Station 1	207	17.5 (±6.0)	0.78	1099 (916, 1350)	1400	25.5	0.16 (0.03, 0.29)	0.14 (.134)
Station 2	188	8.3 (±4.1)	0.77	581 (480, 722)	647	17.6	0.37 (0.24, 0.49)	-0.15 (.140)
Station 3	196	6.5 (±5.8)	0.78	1196 (992, 1478)	1232	23.2	0.30 (0.17, 0.42)	-0.21 (.137)
Station 4	187	7.1 (±3.7)	0.67	563 (465, 700)	611	17.0	0.56 (0.45, 0.65)	0.16 (.141)
Station 5	210	9.4 (±3.0)	0.93	328 (274, 402)	415	13.8	0.20 (0.07, 0.33)	-0.31 (.133)
Station 6	138	13.3 (±4.8)	0.80	615 (493, 795)	787	19.6	0.13 (-0.04, 0.29)	0.13 (.164)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CITIES SERVICE (1976) MODEL: RPSDM AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4187	126.0	76.0	50.0 (±6.2)	0.69 (0.63, 0.76)	-0.54 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6647	97.4	53.0	44.4 (±4.2)	0.76 (0.69, 0.84)	-0.57 (.024)
3. All concentrations, by station (B-1)						
Station 1	1493	101.4	44.8	56.6 (±9.0)	0.89 (0.79, 1.00)	-0.63 (.050)
Station 2	1225	101.1	41.5	59.6 (±9.8)	1.19 (1.06, 1.33)	-0.70 (.055)
Station 3	1175	81.9	72.8	9.1 (±11.5)	0.27 (0.24, 0.30)	-0.47 (.056)
Station 4	1337	102.1	74.3	27.8 (±9.3)	0.92 (0.82, 1.03)	-0.37 (.053)
Station 5	508	75.0	40.3	34.6 (±15.3)	0.30 (0.26, 0.35)	-0.81 (.085)
Station 6	909	111.9	32.0	79.9 (±9.0)	1.26 (1.12, 1.42)	-0.74 (.064)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	2291	88.0	69.5	18.5 (±8.5)	0.40 (0.36, 0.44)	-0.61 (.040)
2.5 to 5 m/sec	3888	100.4	41.5	58.9 (±4.8)	1.31 (1.18, 1.44)	-0.60 (.031)
>5 m/sec	468	118.7	68.0	50.7 (±14.0)	1.73 (1.48, 2.02)	-0.33 (.089)
b. Stability Group						
Class A & B	575	107.4	136.8	-29.4 (±22.5)	0.32 (0.28, 0.37)	-0.36 (.080)
Class C	1264	108.3	112.7	-4.4 (±13.2)	0.42 (0.37, 0.47)	-0.42 (.054)
Class D	3682	102.4	35.5	66.9 (±4.3)	2.65 (2.41, 2.92)	-0.55 (.032)
Class E & F	1126	63.9	0.5	63.4 (±3.8)	76.70 (67.88, 86.67)	-0.99 (.057)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4187	50.0 (±8.5)	0.78	36192 (34695, 37799)	38685	131.2	0.13 (0.10, 0.16)	-0.20 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6647	44.4 (±6.3)	0.79	31871 (30817, 32985)	33842	120.6	-0.05 (-0.07, -0.03)	-0.22 (.024)
3. All concentrations, by station (B-1)								
Station 1	1493	56.6 (±13.9)	0.80	28831 (26877, 31028)	32010	123.3	-0.10 (-0.05, 0.15)	-0.21 (.050)
Station 2	1225	59.6 (±13.5)	0.84	30682 (28400, 33281)	34205	117.5	-0.01 (-0.07, 0.05)	-0.25 (.055)
Station 3	1175	9.1 (±17.6)	0.73	42164 (38965, 45814)	42211	121.6	-0.05 (-0.11, 0.01)	-0.22 (.056)
Station 4	1337	27.8 (±15.5)	0.65	34193 (31752, 36956)	34941	131.7	-0.13 (-0.18, -0.08)	-0.12 (.053)
Station 5	508	34.6 (±15.6)	0.89	28528 (25339, 32427)	29670	99.5	0.10 (0.01, 0.19)	-0.36 (.085)
Station 6	909	79.9 (±11.5)	0.89	19900 (18198, 21878)	26257	114.7	0.06 (-0.01, 0.12)	-0.21 (.064)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	2291	18.6 (±11.6)	0.77	45834 (43299, 48620)	46159	132.5	-0.06 (-0.10, -0.02)	-0.27 (.040)
2.5 to 5 m/sec	3888	59.0 (±7.8)	0.80	23928 (22902, 25032)	27398	113.8	-0.04 (-0.07, -0.01)	-0.19 (.031)
>5 m/sec	468	50.7 (±22.0)	0.67	24567 (21717, 28082)	27080	119.5	-0.02 (-0.11, 0.07)	0.08 (.089)
b. Stability Group								
Class A & B	575	-29.4 (±31.9)	0.61	82161 (73481, 92646)	82684	193.5	-0.10 (-0.18, -0.02)	-0.19 (.080)
Class C	1264	-4.4 (±19.1)	0.66	63431 (58781, 68712)	63400	172.3	-0.11 (-0.16, -0.06)	-0.19 (.054)
Class D	3682	67.0 (±7.1)	0.79	19432 (18576, 20354)	23910	108.9	-0.08 (-0.11, -0.05)	-0.13 (.032)
Class E & F	1126	63.4 (±5.4)	1.00	4084 (3768, 4446)	8094	63.7	0.06 (0.00, 0.12)	-0.26 (.057)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: HPSDM AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Variance Comparison S_o^2/S_p^2	Performance Measures - Unpaired Comparisons: Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1507	103.7	61.3	42.4 (±7.0)	0.90 (0.81, 1.00)	-0.47 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2572	80.3	44.4	35.9 (±4.6)	0.97 (0.89, 1.07)	-0.48 (.038)
3. All concentrations, by station (B-1)						
Station 1	590	82.8	36.9	45.9 (±9.1)	1.91 (1.66, 2.19)	-0.53 (.079)
Station 2	480	83.3	34.7	48.6 (±10.4)	1.56 (1.34, 1.81)	-0.60 (.088)
Station 3	448	68.1	62.5	5.6 (±13.0)	0.27 (0.23, 0.32)	-0.42 (.091)
Station 4	519	83.6	60.9	22.7 (±10.7)	1.29 (1.12, 1.49)	-0.26 (.084)
Station 5	184	62.4	36.9	25.5 (±16.2)	0.44 (0.34, 0.56)	-0.72 (.142)
Station 6	351	92.0	26.8	65.2 (±10.0)	1.82 (1.49, 2.22)	-0.71 (.103)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	648	70.0	61.0	9.0 (±10.7)	0.49 (0.43, 0.56)	-0.46 (.076)
2.5 to 5 m/sec	1519	82.2	37.7	44.5 (±5.8)	1.24 (1.11, 1.37)	-0.55 (.049)
>5 m/sec	405	89.6	43.2	46.4 (±9.9)	2.47 (2.06, 2.96)	-0.37 (.096)
b. Stability Group						
Class A & B	223	84.5	101.0	-16.5 (±23.5)	0.34 (0.27, 0.44)	-0.30 (.129)
Class C	486	85.5	83.2	2.3 (±13.3)	0.61 (0.52, 0.70)	-0.35 (.087)
Class D	1457	84.3	34.6	49.7 (±5.2)	2.56 (2.30, 2.84)	-0.46 (.050)
Class E & F	406	57.2	2.1	55.1 (±5.2)	19.91 (16.88, 23.50)	-0.94 (.095)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1507	42.4 (±7.8)	0.76	15107 (14088, 16252)	16897	92.5	0.22 (0.17, 0.27)	-0.16 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2572	35.9 (±5.8)	0.74	14520 (13760, 15351)	15800	88.5	-0.01 (-0.05, 0.03)	-0.16 (.038)
3. All concentrations, by station (B-1)								
Station 1	590	45.9 (±12.6)	0.74	14360 (12861, 16167)	16441	93.4	-0.13 (-0.21, -0.05)	-0.14 (.079)
Station 2	480	48.6 (±10.8)	0.80	12058 (10675, 13758)	14844	84.9	0.07 (-0.02, 0.16)	-0.19 (.088)
Station 3	448	5.6 (±18.1)	0.70	20718 (18255, 23772)	20703	92.7	-0.06 (-0.15, 0.03)	-0.19 (.091)
Station 4	519	22.7 (±13.3)	0.61	16282 (14480, 18481)	16767	92.1	-0.06 (-0.15, 0.03)	0.09 (.084)
Station 5	184	25.5 (±13.5)	0.82	9066 (7471, 11301)	9667	72.6	0.29 (0.15, 0.42)	-0.30 (.142)
Station 6	351	65.1 (±10.6)	0.89	7337 (6364, 8578)	11559	83.2	0.21 (0.11, 0.31)	-0.17 (.103)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	648	9.0 (±12.3)	0.68	19070 (17163, 21349)	19121	95.6	0.01 (-0.0[illegible], 0.09)	-0.20 (.076)
2.5 to 5 m/sec	1519	44.5 (±7.4)	0.78	13240 (12350, 14240)	15213	87.5	-0.01 (-0.0[illegible], 0.04)	-0.17 (.049)
>5 m/sec	405	46.4 (±13.2)	0.71	10563 (9249, 12211)	12687	81.0	-0.03 (-0.13, 0.07)	0.11 (.096)
b. Stability Group								
Class A & B	223	-16.4 (±29.6)	0.56	32344 (27106, 39458)	32469	124.8	-0.02 (-0.15, 0.11)	-0.13 (.129)
Class C	486	2.3 (±16.2)	0.61	22844 (20226, 26062)	22803	110.5	-0.01 (-0.10, 0.08)	-0.14 (.087)
Class D	1457	49.7 (±6.7)	0.75	11192 (10425, 12056)	13656	84.3	-0.08 (-0.13, -0.03)	0.11 (.050)
Class E & F	406	55.0 (±6.0)	0.97	2936 (2571, 3393)	5956	57.5	-0.04 (-0.14, 0.06)	-0.25 (.095)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o'/S_p'	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	46.0	25.7	20.3 (±4.6)	1.26 (1.03, 1.54)	-0.35 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1175	26.0	12.5	13.5 (±1.9)	1.57 (1.40, 1.76)	-0.50 (.056)
3. All concentrations, by station (B-1)						
Station 1	242	29.0	11.6	17.4 (±4.3)	2.47 (1.98, 3.09)	-0.51 (.124)
Station 2	236	26.0	9.1	16.9 (±3.8)	2.50 (2.02, 3.11)	-0.59 (.125)
Station 3	191	23.5	18.2	5.3 (±5.2)	0.49 (0.38, 0.62)	-0.44 (.139)
Station 4	219	29.0	19.5	9.5 (±5.5)	2.03 (1.62, 2.54)	-0.29 (.130)
Station 5	124	15.6	7.0	8.6 (±4.0)	0.90 (0.67, 1.22)	-0.77 (.172)
Station 6	163	28.1	7.2	20.9 (±4.0)	3.62 (2.79, 4.71)	-0.64 (.151)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons						
		Bias		Characteristic Discrepancies				
		Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Fraction of Positive Residuals ($C_o > C_p$)	Noise (Variance) ($\mu g/m^3$)^2	Gross Variability ($\mu g/m^3$)^2	Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	20.3 (±3.7)	0.81	1125 (976, 1314)	1534	29.7	0.44 (0.35, 0.52)	0.09 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1175	13.4 (±1.8)	0.80	815 (753, 886)	995	21.9	0.29 (0.24, 0.34)	-0.14 (.056)
3. All concentrations, by station (B-1)								
Station 1	242	17.4 (±4.6)	0.81	976 (823, 1181)	1276	24.7	0.18 (0.06, 0.30)	0.16 (.124)
Station 2	236	16.9 (±3.6)	0.87	582 (490, 706)	865	21.3	0.37 (0.25, 0.48)	0.14 (.125)
Station 3	191	5.4 (±5.2)	0.71	1157 (957, 1436)	1180	23.6	0.16 (0.02, 0.30)	-0.17 (.139)
Station 4	219	9.5 (±4.4)	0.68	981 (820, 1200)	1066	22.0	0.46 (0.13, 0.00)	0.14 (.130)
Station 5	124	8.7 (±2.6)	0.85	255 (202, 336)	328	13.7	0.49 (0.34, 0.61)	-0.24 (.172)
Station 6	163	20.9 (±3.4)	0.90	529 (431, 669)	963	22.9	0.28 (0.13, 0.42)	0.13 (.151)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: COMPTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3792	108.9	112.2	-3.3 (±7.4)	0.41 (0.37, 0.45)	-0.43 (.031)
2. All concentrations, all stations (paired in time and location) (B-3)	5956	87.4	78.4	9.0 (±5.1)	0.43 (0.39, 0.47)	-0.50 (.025)
3. All concentrations, by station (B-1)						
Station 1	1399	92.6	67.7	24.9 (±9.3)	0.55 (0.49, 0.62)	-0.55 (.051)
Station 2	883	96.4	97.7	-1.3 (±15.2)	0.35 (0.31, 0.40)	-0.50 (.065)
Station 3	1177	82.1	94.0	-11.9 (±12.9)	0.34 (0.30, 0.38)	-0.43 (.056)
Station 4	1075	93.0	123.0	-30.0 (±12.7)	0.43 (0.38, 0.48)	-0.25 (.059)
Station 5	752	55.4	27.6	27.8 (±9.0)	0.18 (0.16, 0.21)	-0.77 (.070)
Station 6	670	101.0	33.5	67.5 (±12.4)	1.33 (1.16, 1.53)	-0.75 (.074)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	2476	81.4	63.2	18.2 (±7.5)	0.46 (0.42, 0.51)	-0.59 (.039)
2.5 to 5 m/sec	2995	86.3	83.6	2.7 (±7.1)	0.38 (0.35, 0.42)	-0.47 (.035)
>5 m/sec	485	124.8	124.0	0.8 (±20.7)	0.54 (0.46, 0.62)	-0.36 (.087)
b. Stability Group						
Class A & B	568	101.5	143.1	-41.6 (±23.9)	0.22 (0.19, 0.26)	-0.46 (.081)
Class C	989	109.8	137.6	-27.8 (±17.4)	0.34 (0.31, 0.39)	-0.44 (.061)
Class D	3167	90.7	60.2	30.5 (±5.4)	0.75 (0.68, 0.83)	-0.49 (.034)
Class E & F	1232	54.5	47.8	6.7 (±8.0)	0.45 (0.40, 0.50)	-0.63 (.055)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: COMPTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $\lvert f(d) - f_n \rvert$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3792	-3.4 (±10.0)	0.67	44602 (42667, 46686)	44601	137.4	0.19 (0.16, 0.22)	-0.20 (.031)
2. All concentrations, all stations (paired in time and location) (B-3)	5956	9.0 (±7.1)	0.72	39002 (37641, 40445)	39076	124.9	0.02 (-0.01, 0.05)	-0.23 (.025)
3. All concentrations, by station (B-1)								
Station 1	1399	24.9 (±15.5)	0.75	35324 (32856, 38109)	35917	130.9	-0.12 (-0.17, -0.07)	-0.24 (.051)
Station 2	883	-1.2 (±18.1)	0.71	48607 (44396, 53511)	48554	139.9	0.10 (0.03, 0.16)	-0.25 (.065)
Station 3	1177	-11.9 (±17.5)	0.66	48170 (44520, 52334)	48271	123.9	0.06 (0.01, 0.12)	-0.19 (.056)
Station 4	1075	-30.0 (±17.8)	0.56	46907 (43199, 51164)	47761	154.6	-0.05 (-0.11, 0.01)	-0.14 (.059)
Station 5	752	27.8 (±10.6)	0.87	14356 (13016, 15936)	15109	69.5	0.14 (0.07, 0.21)	-0.34 (.070)
Station 6	670	67.5 (±18.0)	0.88	25481 (22973, 28468)	29995	109.2	0.06 (-0.02, 0.14)	-0.25 (.074)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	2476	18.2 (±10.2)	0.76	36544 (34597, 38676)	36859	119.0	-0.01 (-0.05, 0.03)	-0.26 (.039)
2.5 to 5 m/sec	2995	2.7 (±10.1)	0.70	38601 (36724, 40640)	38595	123.1	0.02 (-0.02, 0.06)	-0.22 (.035)
>5 m/sec	485	0.7 (±31.6)	0.64	53475 (47348, 61008)	53365	166.6	0.02 (-0.07, 0.11)	-0.16 (.087)
b. Stability Group								
Class A & B	568	-41.7 (±30.8)	0.66	80412 (71876, 90733)	82007	179.5	0.06 (-0.02, 0.14)	-0.24 (.081)
Class C	989	-27.9 (±24.1)	0.66	81301 (74619, 89017)	81996	185.8	-0.05 (-0.11, 0.01)	-0.22 (.061)
Class D	3167	30.5 (±7.7)	0.73	23118 (22023, 24304)	24039	109.1	0.04 (0.01, 0.07)	-0.19 (.034)
Class E & F	1232	6.8 (±13.3)	0.77	8338 (7720, 9041)	23485	91.7	-0.14 (-0.19, -0.08)	-0.30 (.055)

TABLE B. (PART I) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: COMPTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1367	88.7	88.8	-0.1 (±8.2)	0.52 (0.47, 0.59)	-0.33 (.052)
2. All concentrations, all stations (paired in time and location) (B-3)	2344	70.3	64.4	5.9 (±5.3)	0.55 (0.50, 0.61)	-0.36 (.040)
3. All concentrations, by station (B-1)						
Station 1	556	75.4	55.9	19.6 (±10.1)	0.75 (0.65, 0.86)	-0.41 (.082)
Station 2	374	72.3	75.8	-3.5 (±14.9)	0.45 (0.37, 0.54)	-0.34 (.099)
Station 3	461	67.2	77.4	-10.2 (±19.7)	0.43 (0.37, 0.50)	-0.31 (.090)
Station 4	442	71.4	95.1	-23.7 (±12.6)	0.61 (0.52, 0.72)	0.14 (.091)
Station 5	258	47.6	25.8	21.8 (±10.0)	0.23 (0.18, 0.28)	-0.69 (.120)
Station 6	253	83.3	28.5	54.8 (±13.3)	1.63 (1.30, 2.03)	-0.74 (.121)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	666	66.2	47.8	18.4 (±9.1)	0.68 (0.60, 0.78)	-0.44 (.074)
2.5 to 5 m/sec	1381	68.2	66.8	1.4 (±6.9)	0.48 (0.43, 0.53)	-0.36 (.052)
>5 m/sec	297	89.5	90.7	-1.2 (±17.1)	0.67 (0.54, 0.83)	-0.26 (.112)
b. Stability Group						
Class A & B	204	75.7	111.5	-35.8 (±24.4)	0.33 (0.26, 0.42)	-0.30 (.135)
Class C	423	87.5	91.1	-3.6 (±16.1)	0.47 (0.40, 0.56)	-0.35 (.094)
Class D	1284	72.0	56.6	15.4 (±6.3)	0.73 (0.66, 0.81)	-0.36 (.054)
Class E & F	433	45.9	39.3	6.6 (±8.9)	0.61 (0.51, 0.72)	-0.45 (.092)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: COMPTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[F(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1367	-0.1 (±9.4)	0.61	17207 (15992, 18580)	17194	92.1	0.29 (0.24, 0.34)	-0.13 (.052)
2. All concentrations, all stations (paired in time and location) (B-3)	2344	5.9 (±6.8)	0.64	15979 (15105, 16938)	16007	88.2	0.08 (0.04, 0.12)	-0.15 (.040)
3. All concentrations, by station (B-1)								
Station 1	556	19.6 (±15.3)	0.67	16253 (14509, 18366)	16607	99.3	-0.11 (-0.19, -0.03)	-0.15 (.082)
Station 2	374	-3.5 (±15.1)	0.60	17269 (15356, 20507)	17235	89.2	0.22 (0.12, 0.31)	-0.16 (.099)
Station 3	461	-10.3 (±16.4)	0.59	19973 (17631, 22867)	20036	88.7	0.12 (0.03, 0.21)	-0.16 (.090)
Station 4	442	-23.7 (±15.5)	0.46	16903 (14881, 19414)	17427	100.8	0.07 (-0.02, 0.16)	-0.06 (.091)
Station 5	258	21.8 (±11.8)	0.81	5771 (4895, 6934)	6225	54.8	0.18 (0.06, 0.30)	-0.31 (.120)
Station 6	253	54.8 (±18.3)	0.86	10071 (8530, 12123)	13030	82.0	0.13 (0.01, 0.25)	-0.20 (.121)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	666	18.3 (±11.7)	0.69	14121 (12726, 15783)	14435	85.0	0.02 (-0.06, 0.10)	-0.17 (.074)
2.5 to 5 m/sec	1381	1.4 (±9.1)	0.64	16375 (15224, 17675)	16365	87.9	0.06 (0.01, 0.11)	-0.16 (.052)
>5 m/sec	297	-1.2 (±19.7)	0.56	17928 (15382, 21240)	17869	97.0	0.21 (0.10, 0.32)	-0.10 (.112)
b. Stability Group								
Class A & B	204	-35.8 (±27.0)	0.56	27503 (22874, 33879)	28649	117.8	0.14 (0.01, 0.27)	-0.15 (.135)
Class C	423	-3.6 (±20.0)	0.61	28055 (24632, 32326)	28001	117.8	0.02 (-0.08, 0.12)	-0.15 (.094)
Class D	1284	15.4 (±8.2)	0.66	11721 (10868, 12688)	11949	80.2	0.11 (0.06, 0.16)	-0.13 (.054)
Class E & F	433	6.6 (±13.5)	0.66	10349 (9105, 11895)	10368	69.0	-0.16 (-0.25, -0.06)	-0.20 (.092)

TABLE B. (PART I) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: COMPTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	337	38.3	34.9	3.4 ($\pm$5.9)	0.59 (0.48, 0.72)	-0.32 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1152	21.9	16.7	5.2 ($\pm$2.2)	0.69 (0.62, 0.77)	-0.47 (.057)
3. All concentrations, by station (B-1)						
Station 1	215	28.5	17.9	10.6 ($\pm$5.5)	1.31 (1.04, 1.65)	-0.37 (.131)
Station 2	191	20.8	18.4	2.4 ($\pm$5.3)	0.57 (0.45, 0.72)	-0.41 (.139)
Station 3	203	23.4	22.9	0.5 ($\pm$6.3)	0.52 (0.41, 0.65)	-0.41 (.135)
Station 4	197	23.6	27.5	-3.9 ($\pm$6.2)	0.54 (0.43, 0.68)	-0.30 (.137)
Station 5	211	13.4	4.2	9.2 ($\pm$2.3)	0.47 (0.37, 0.59)	-0.81 (.132)
Station 6	135	21.9	6.9	15.0 ($\pm$4.6)	2.30 (1.73, 3.05)	-0.67 (.166)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: COMPTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $\lvert r(d) - f_n \rvert$ max (fraction)
1. Highest concentration, event-by-event (A-1)	337	3.4 (±4.6)	0.64	1433 (1239, 1681)	1441	26.9	0.55 (0.47, 0.62)	-0.11 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1152	5.2 (±2.2)	0.72	947 (875, 1030)	974	20.5	0.37 (0.32, 0.42)	-0.16 (.057)
3. All concentrations, by station (B-1)								
Station 1	215	10.6 (±5.6)	0.71	1444 (1207, 1768)	1549	26.9	0.16 (0.03, 0.29)	-0.11 (.131)
Station 2	191	2.4 (±3.8)	0.65	661 (547, 820)	663	18.0	0.54 (0.43, 0.63)	-0.15 (.139)
Station 3	203	0.5 (±6.2)	0.66	1327 (1104, 1635)	1321	22.9	0.37 (0.24, 0.48)	-0.17 (.135)
Station 4	197	-3.9 (±5.3)	0.54	1114 (924, 1377)	1124	22.2	0.50 (0.39, 0.60)	-0.13 (.137)
Station 5	211	9.2 (±2.1)	0.92	191 (159, 234)	275	12.7	0.37 (0.25, 0.48)	-0.25 (.132)
Station 6	135	15.0 (±5.0)	0.84	627 (501, 814)	846	20.4	0.16 (-0.01, 0.32)	-0.15 (.166)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: COMPTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4387	120.5	113.1	7.4 (±7.0)	0.43 (0.39, 0.48)	-0.43 (.029)
2. All concentrations, all stations (paired in time and location) (B-3)	7016	92.6	78.1	14.5 (±4.7)	0.46 (0.42, 0.51)	-0.50 (.023)
3. All concentrations, by station (B-1)						
Station 1	1555	97.5	69.2	28.3 (±9.3)	0.69 (0.63, 0.76)	-0.56 (.049)
Station 2	1278	97.2	62.6	34.6 (±11.1)	0.64 (0.57, 0.72)	-0.66 (.054)
Station 3	1333	72.9	111.5	-38.6 (±12.6)	0.18 (0.16, 0.20)	-0.30 (.053)
Station 4	1410	97.1	115.7	-18.6 (±10.9)	0.49 (0.44, 0.55)	-0.28 (.051)
Station 5	557	68.7	40.9	27.8 (±13.5)	0.36 (0.32, 0.42)	-0.64 (.081)
Station 6	883	115.0	28.9	86.1 (±9.9)	1.08 (0.96, 1.22)	-0.82 (.065)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	2377	85.0	72.5	12.5 (±8.4)	0.39 (0.36, 0.44)	-0.58 (.039)
2.5 to 5 m/sec	4152	94.4	75.0	19.4 (±5.9)	0.52 (0.47, 0.57)	-0.48 (.030)
>5 m/sec	487	114.3	131.5	-17.2 (±20.2)	0.41 (0.34, 0.49)	-0.27 (.087)
b. Stability Group						
Class A & B	546	112.8	153.5	-40.7 (±26.0)	0.24 (0.21, 0.28)	-0.41 (.082)
Class C	1253	109.1	137.4	-28.3 (±15.2)	0.29 (0.26, 0.33)	-0.42 (.054)
Class D	3858	98.0	60.4	37.6 (±5.1)	1.01 (0.92, 1.11)	-0.47 (.031)
Class E & F	1359	54.0	43.3	10.7 (±7.1)	0.27 (0.25, 0.30)	-0.69 (.052)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: COMPTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4387	7.4 (±9.5)	0.67	47317 (45402, 49367)	47361	146.4	0.16 (0.13, 0.19)	-0.18 (.029)
2. All concentrations, all stations (paired in time and location) (B-3)	7016	14.5 (±7.4)	0.71	42823 (41443, 44279)	43028	135.3	-0.06 (-0.08, -0.04)	-0.21 (.023)
3. All concentrations, by station (B-1)								
Station 1	1555	28.3 (±16.9)	0.75	39548 (36919, 42497)	40325	139.0	-0.12 (-0.17, -0.07)	-0.23 (.049)
Station 2	1278	34.6 (±15.6)	0.79	41677 (38638, 45126)	42841	128.9	-0.01 (-0.06, 0.04)	-0.26 (.054)
Station 3	1333	-38.7 (±18.8)	0.56	55740 (51755, 60251)	57194	140.5	-0.02 (-0.07, 0.03)	-0.17 (.053)
Station 4	1410	-18.6 (±18.0)	0.58	48744 (45350, 52572)	49056	159.0	-0.13 (-0.18, -0.08)	-0.14 (.051)
Station 5	557	27.8 (±15.6)	0.81	24500 (21874, 27682)	25231	92.2	0.08 (0.00, 0.16)	-0.29 (.081)
Station 6	883	86.1 (±12.1)	0.92	20888 (19077, 22997)	28277	119.5	0.08 (0.01, 0.15)	-0.23 (.065)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	2377	12.6 (±12.2)	0.75	46353 (43835, 49116)	46491	133.9	-0.08 (-0.12, -0.04)	-0.26 (.039)
2.5 to 5 m/sec	4152	19.4 (±9.8)	0.71	39400 (37763, 41156)	39767	132.8	-0.06 (-0.09, -0.03)	-0.20 (.030)
>5 m/sec	487	-17.2 (±31.2)	0.57	53747 (47623, 61267)	53932	163.5	-0.04 (-0.13, 0.05)	-0.10 (.087)
b. Stability Group								
Class A & B	546	-40.7 (±36.8)	0.65	101030 (90111, 114283)	102505	209.8	-0.06 (-0.14, 0.02)	-0.22 (.082)
Class C	1253	-28.3 (±24.0)	0.65	82268 (76212, 89149)	83003	192.2	-0.10 (-0.15, -0.04)	-0.21 (.054)
Class D	3858	37.6 (±8.4)	0.71	27886 (26685, 29177)	29296	122.3	-0.08 (-0.11, -0.05)	-0.16 (.031)
Class E & F	1359	10.7 (±12.6)	0.79	21163 (19664, 22857)	21261	89.8	-0.21 (-0.26, -0.16)	-0.32 (.052)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: COMPTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1586	98.9	89.8	9.1 (±7.8)	0.57 (0.51, 0.63)	-0.35 (.048)
2. All concentrations, all stations (paired in time and location) (B-3)	2745	75.6	64.8	10.8 (±5.1)	0.61 (0.55, 0.67)	-0.38 (.037)
3. All concentrations, by station (B-1)						
Station 1	615	79.6	57.4	22.2 (±10.5)	0.88 (0.77, 1.01)	-0.46 (.078)
Station 2	509	79.1	51.7	27.4 (±11.4)	0.87 (0.76, 1.00)	-0.52 (.085)
Station 3	513	60.3	94.4	-34.1 (±13.4)	0.21 (0.18, 0.24)	-0.21 (.085)
Station 4	567	77.1	92.0	-15.0 (±11.4)	0.78 (0.68, 0.90)	-0.18 (.081)
Station 5	198	58.3	36.8	21.5 (±15.2)	0.46 (0.37, 0.58)	-0.57 (.137)
Station 6	343	94.0	24.4	69.6 (±10.7)	1.36 (1.10, 1.67)	-0.78 (.104)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	654	69.3	56.1	13.2 (±10.0)	0.59 (0.52, 0.67)	-0.45 (.075)
2.5 to 5 m/sec	1667	75.5	63.4	12.1 (±6.6)	0.60 (0.54, 0.66)	-0.40 (.047)
>5 m/sec	424	86.0	83.8	2.2 (±12.8)	0.68 (0.57, 0.82)	-0.25 (.093)
b. Stability Group						
Class A & B	214	87.7	111.9	-24.2 (±25.2)	0.30 (0.24, 0.38)	-0.34 (.131)
Class C	487	85.2	94.6	-9.4 (±15.0)	0.43 (0.37, 0.49)	-0.34 (.087)
Class D	1526	80.9	58.9	22.0 (±6.2)	0.97 (0.87, 1.07)	-0.35 (.049)
Class E & F	518	46.2	34.7	11.5 (±7.9)	0.45 (0.39, 0.52)	-0.59 (.085)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: COMPTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability ($\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1586	9.1 (±9.2)	0.63	19295 (18024, 20719)	19365	99.7	0.24 (0.19, 0.29)	-0.13 (.048)
2. All concentrations, all stations (paired in time and location) (B-3)	2745	10.8 (±7.1)	0.64	19255 (18279, 20319)	19366	98.3	0.05 (0.01, 0.09)	-0.14 (.037)
3. All concentrations, by station (B-1)								
Station 1	615	22.2 (±16.4)	0.67	20524 (18423, 23046)	20985	105.1	-0.16 (-0.24, -0.08)	-0.15 (.078)
Station 2	509	27.4 (±13.0)	0.71	16614 (14760, 18880)	17331	92.2	-0.04 (-0.13, 0.05)	-0.18 (.085)
Station 3	513	-34.2 (±19.0)	0.48	24426 (21708, 27746)	25545	103.0	-0.02 (-0.11, 0.07)	-0.15 (.085)
Station 4	567	-15.0 (±15.5)	0.48	20642 (18449, 23294)	20829	107.9	-0.08 (-0.16, 0.02)	0.07 (.081)
Station 5	198	21.5 (±14.4)	0.76	9607 (7969, 11874)	10021	70.8	0.20 (0.06, 0.33)	-0.25 (.137)
Station 6	343	69.7 (±11.2)	0.92	8386 (7262, 9823)	13214	88.3	0.18 (0.08, 0.28)	-0.21 (.104)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	654	13.1 (±13.3)	0.67	18484 (16644, 20680)	18629	96.3	-0.08 (-0.16, 0.00)	-0.19 (.075)
2.5 to 5 m/sec	1667	12.1 (±9.4)	0.65	19663 (18398, 21076)	19799	98.1	-0.04 (-0.09, 0.01)	-0.15 (.047)
>5 m/sec	424	2.2 (±18.4)	0.55	18840 (16544, 21704)	18801	102.4	-0.05 (-0.14, 0.05)	0.08 (.093)
b. Stability Group								
Class A & B	214	-24.2 (±33.4)	0.57	35890 (29972, 43978)	36307	138.1	-0.02 (-0.15, 0.11)	-0.15 (.131)
Class C	487	-9.4 (±21.2)	0.60	30224 (26764, 34477)	30250	122.9	-0.07 (-0.16, 0.02)	-0.16 (.087)
Class D	1526	22.0 (±8.8)	0.64	16080 (15002, 17291)	16552	94.4	-0.07 (-0.12, -0.02)	-0.11 (.049)
Class E & F	518	11.5 (±11.8)	0.71	10310 (9169, 11702)	10423	70.2	-0.25 (-0.32, -0.16)	-0.23 (.085)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: COMPTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value $\bar{C}_o$ ($\mu g/m^3$)	Average Predicted Value $\bar{C}_p$ ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Variance Comparison S_o^2/S_p^2	Performance Measures - Unpaired Comparisons: Frequency Distribution Comparison $[F(C_o) - F(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	356	45.9	38.5	7.4 (±5.8)	0.55 (0.45, 0.67)	-0.29 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1203	25.4	19.0	6.4 (±2.3)	0.70 (0.63, 0.77)	-0.43 (.055)
3. All concentrations by station (B-1)						
Station 1	248	28.4	18.2	10.2 (±5.1)	0.94 (0.75, 1.18)	-0.46 (.122)
Station 2	241	25.5	13.9	11.6 (±4.3)	1.15 (0.92, 1.44)	-0.49 (.124)
Station 3	204	22.2	29.8	-7.6 (±6.6)	0.24 (0.19, 0.30)	-0.28 (.135)
Station 4	221	28.7	31.5	-2.8 (±6.6)	0.85 (0.67, 1.07)	-0.25 (.129)
Station 5	127	15.3	7.6	7.7 (±4.1)	0.73 (0.54, 0.99)	-0.67 (.171)
Station 6	162	28.3	6.3	22.0 (±4.1)	3.43 (2.64, 4.46)	-0.71 (.151)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: COMPTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons						
		Bias		Characteristic Discrepancies				
		Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Fraction of Positive Residuals ($C_o > C_p$)	Noise (Variance) ($\mu g/m^3$)^2	Gross Variability ($\mu g/m^3$)^2	Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - r_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	356	7.4 (±4.5)	0.65	1613 (1400, 1884)	1663	29.5	0.51 (0.43, 0.58)	-0.09 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1203	6.4 (±2.4)	0.71	1198 (1108, 1300)	1238	23.7	0.29 (0.24, 0.34)	-0.14 (.055)
3. All concentrations, by station (B-1)								
Station 1	248	10.2 (±5.7)	0.73	1474 (1246, 1779)	1572	27.1	0.14 (0.02, 0.26)	-0.14 (.122)
Station 2	241	11.6 (±4.0)	0.76	752 (634, 910)	884	21.2	0.35 (0.23, 0.46)	-0.13 (.124)
Station 3	204	-7.6 (±7.0)	0.54	1792 (1491, 2206)	1842	26.8	0.28 (0.15, 0.40)	-0.17 (.135)
Station 4	221	-2.8 (±5.0)	0.54	1330 (1114, 1623)	1332	24.5	0.47 (0.36, 0.57)	0.13 (.129)
Station 5	127	7.7 (±3.4)	0.83	315 (250, 413)	372	14.1	0.44 (0.29, 0.57)	-0.21 (.171)
Station 6	162	22.0 (±3.8)	0.91	568 (463, 719)	1048	24.4	0.21 (0.06, 0.35)	-0.13 (.151)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: SCSTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3478	118.2	46.2	72.0 (±6.0)	0.93 (0.85, 1.02)	-0.74 (.033)
2. All concentrations, all stations (paired in time and location) (B-3)	5357	96.5	33.7	62.8 (±4.2)	1.02 (0.93, 1.12)	-0.76 (.026)
3. All concentrations, by station (B-1)						
Station 1	1295	99.6	30.1	69.5 (±7.5)	1.52 (1.36, 1.70)	-0.71 (.053)
Station 2	802	105.6	48.1	57.5 (±12.9)	0.71 (0.64, 0.78)	-0.73 (.068)
Station 3	1002	94.9	34.2	60.7 (±10.9)	0.83 (0.74, 0.94)	-0.85 (.061)
Station 4	915	108.3	48.6	59.7 (±10.5)	1.18 (1.04, 1.34)	-0.55 (.064)
Station 5	690	59.9	8.8	51.1 (±6.4)	0.50 (0.44, 0.57)	-0.96 (.073)
Station 6	653	103.5	28.1	75.4 (±12.3)	1.50 (1.31, 1.73)	-0.84 (.075)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	2197	91.1	33.7	57.4 (±6.8)	0.86 (0.77, 0.95)	-0.81 (.041)
2.5 to 5 m/sec	2720	94.3	33.9	60.3 (±5.7)	0.96 (0.86, 1.06)	-0.74 (.037)
>5 m/sec	440	136.8	32.9	103.9 (±14.5)	4.40 (3.72, 5.19)	-0.62 (.092)
b. Stability Group						
Class A & B	553	104.1	120.4	-16.3 (±21.5)	0.30 (0.26, 0.35)	-0.52 (.082)
Class C	948	114.2	83.1	31.1 (±13.6)	0.79 (0.71, 0.89)	-0.52 (.062)
Class D	2796	101.9	11.3	90.6 (±4.0)	8.30 (7.48, 9.21)	-0.84 (.036)
Class E & F	1060	62.3	3.7	58.6 (±5.1)	33.43 (29.58, 37.77)	-0.89 (.059)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: SCSTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3478	71.9 (±8.4)	0.87	27378 (26139, 28716)	32547	121.3	0.17 (0.14, 0.20)	-0.24 (.033)
2. All concentrations, all stations (paired in time and location) (B-3)	5357	62.7 (±5.8)	0.88	23559 (22694, 24480)	27488	108.0	0.04 (0.01, 0.07)	-0.26 (.026)
3. All concentrations, by station (B-1)								
Station 1	1295	69.5 (±12.0)	0.85	20085 (18630, 21735)	24894	110.8	-0.05 (-0.10, 0.01)	-0.21 (.053)
Station 2	802	57.6 (±17.8)	0.86	33707 (30653, 37290)	36980	126.2	0.03 (-0.04, 0.10)	-0.29 (.068)
Station 3	1002	60.7 (±14.8)	0.91	29322 (26927, 32085)	32973	109.7	0.06 (-0.01, 0.12)	-0.32 (.061)
Station 4	915	59.6 (±13.4)	0.78	25237 (22786, 28148)	28766	117.1	0.04 (-0.02, 0.10)	-0.16 (.064)
Station 5	690	51.1 (±6.7)	0.98	6545 (5909, 7300)	9143	63.7	0.13 (0.06, 0.20)	-0.34 (.073)
Station 6	653	75.4 (±18.1)	0.91	24505 (22065, 27418)	30154	111.8	0.06 (-0.02, 0.14)	-0.27 (.075)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	2197	57.4 (±9.1)	0.89	25388 (23956, 26965)	28674	107.5	0.03 (-0.01, 0.07)	-0.30 (.041)
2.5 to 5 m/sec	2720	60.3 (±7.8)	0.87	21622 (20521, 22823)	25254	103.7	0.06 (0.02, 0.10)	-0.25 (.037)
>5 m/sec	440	103.9 (±23.6)	0.84	24645 (21694, 28310)	35379	137.1	-0.04 (-0.13, 0.05)	-0.13 (.092)
b. Stability Group								
Class A & B	553	-16.3 (±27.3)	0.70	62466 (55754, 70603)	62619	162.6	0.07 (-0.01, 0.15)	-0.25 (.082)
Class C	948	31.1 (±18.0)	0.74	47017 (43076, 51582)	47935	148.0	-0.02 (-0.08, 0.04)	-0.21 (.062)
Class D	2796	90.6 (±5.9)	0.93	11686 (11099, 12326)	19891	100.6	0.03 (-0.01, 0.07)	-0.19 (.036)
Class E & F	1060	58.7 (±8.5)	0.95	7479 (6884, 8163)	10914	63.4	-0.09 (-0.15, -0.02)	-0.28 (.059)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: SCSTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1230	97.7	37.4	60.2 (±6.9)	1.20 (1.07, 1.35)	-0.70 (.055)
2. All concentrations, all stations (paired in time and location) (B-3)	2025	80.2	28.6	51.6 (±4.6)	1.30 (1.16, 1.46)	-0.70 (.043)
3. All concentrations, by station (B-1)						
Station 1	497	83.6	25.5	58.1 (±8.5)	2.23 (1.94, 2.57)	-0.64 (.086)
Station 2	324	82.3	38.8	43.5 (±13.5)	0.83 (0.68, 1.02)	-0.65 (.107)
Station 3	385	78.3	28.4	49.9 (±11.9)	1.10 (0.91, 1.33)	-0.79 (.098)
Station 4	341	91.0	40.4	50.6 (±11.7)	1.48 (1.21, 1.80)	-0.54 (.104)
Station 5	231	52.2	8.8	43.4 (±7.4)	0.57 (0.45, 0.71)	-0.94 (.127)
Station 6	247	85.1	23.9	61.2 (±13.2)	1.84 (1.47, 2.30)	-0.81 (.122)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	562d	77.4	25.0	52.4 (±8.8)	1.20 (1.04, 1.38)	-0.75 (.081)
2.5 to 5 m/sec	1204	77.1	31.2	45.9 (±6.0)	1.06 (0.96, 1.18)	-0.70 (.055)
>5 m/sec	259	101.2	24.4	76.8 (±12.9)	4.94 (3.95, 6.18)	-0.65 (.119)
b. Stability Group						
Class A & B	200	77.0	91.6	-14.6 (±21.8)	0.46 (0.37, 0.58)	-0.34 (.136)
Class C	398	92.7	56.1	36.6 (±13.3)	1.04 (0.87, 1.25)	-0.50 (.096)
Class D	1097	83.0	14.8	68.2 (±5.0)	4.14 (3.70, 4.64)	-0.79 (.058)
Class E & F	330	58.0	3.0	55.0 (±6.8)	30.63 (24.90, 37.67)	-0.92 (.106)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: SCSTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1230	60.3 (±8.3)	0.86	11761 (10888, 12754)	15383	90.3	0.22 (0.17, 0.27)	-0.19 (.055)
2. All concentrations, all stations (paired in time and location) (B-3)	2025	51.7 (±5.7)	0.85	10441 (9829, 11118)	13104	82.5	0.08 (0.04, 0.12)	-0.21 (.043)
3. All concentrations, by station (B-1)								
Station 1	497	58.1 (±12.2)	0.82	9959 (8830, 11343)	13316	86.6	-0.08 (-0.17, 0.01)	-0.16 (.086)
Station 2	324	43.5 (±15.9)	0.82	14492 (12503, 17054)	16338	90.0	0.06 (-0.05, 0.17)	-0.23 (.107)
Station 3	385	49.9 (±14.4)	0.88	12709 (11092, 14749)	15167	84.1	0.09 (-0.01, 0.19)	-0.28 (.098)
Station 4	341	50.7 (±12.2)	0.77	10326 (8939, 12102)	12865	86.3	0.15 (0.04, 0.25)	-0.11 (.104)
Station 5	231	43.3 (±8.2)	0.97	2750 (2311, 3342)	4616	56.1	0.17 (0.04, 0.29)	-0.32 (.127)
Station 6	247	61.2 (±10.2)	0.89	9783 (8268, 11809)	13486	84.5	0.12 (-0.01, 0.24)	-0.22 (.122)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	562	52.4 (±10.3)	0.87	10491 (9372, 11845)	13214	83.0	0.07 (-0.01, 0.15)	-0.24 (.081)
2.5 to 5 m/sec	1204	45.9 (±7.6)	0.84	10267 (9497, 11143)	12365	80.0	0.09 (0.03, 0.15)	-0.23 (.055)
>5 m/sec	259	76.9 (±14.2)	0.86	10430 (8848, 12532)	16300	93.1	0.09 (-0.03, 0.21)	0.15 (.119)
b. Stability Group								
Class A & B	200	-14.5 (±22.7)	0.62	21457 (17822, 26475)	21560	104.0	0.14 (0.01, 0.27)	-0.16 (.136)
Class C	398	36.6 (±16.0)	0.72	17608 (15400, 20382)	18905	99.8	0.04 (-0.06, 0.14)	-0.16 (.096)
Class D	1097	68.2 (±6.1)	0.91	6649 (6126, 7249)	11287	79.8	0.07 (0.01, 0.12)	-0.17 (.058)
Class E & F	330	55.0 (±10.0)	0.96	4004 (3459, 4704)	7021	57.7	-0.05 (-0.18, 0.08)	-0.26 (.106)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: SCSTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons		
				Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $\lvert f(C_o) - f(C_p) \rvert$ max (fraction)
1. Highest concentration, event-by-event (A-1)	334	38.6	14.5	24.1 ($\pm$4.3)	2.28 (1.86, 2.81)	-0.57 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1091	23.0	6.9	16.1 ($\pm$1.7)	2.73 (2.41, 3.08)	-0.72 (.058)
3. All concentrations, by station (B-1)						
Station 1	206	29.6	7.9	21.7 ($\pm$4.6)	6.39 (5.19, 7.86)	-0.54 (.134)
Station 2	179	22.1	8.7	13.4 ($\pm$4.2)	1.53 (1.18, 1.97)	-0.68 (.143)
Station 3	193	24.5	7.6	16.9 ($\pm$4.6)	2.10 (1.66, 2.67)	-0.80 (.138)
Station 4	174	26.3	10.6	15.7 ($\pm$4.8)	2.86 (2.22, 3.69)	-0.59 (.146)
Station 5	206	13.7	1.3	12.4 ($\pm$1.6)	1.85 (1.47, 2.33)	-0.96 (.134)
Station 6	133	22.2	5.7	16.5 ($\pm$4.6)	2.58 (1.93, 3.46)	-0.77 (.167)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: SCSTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability ($\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	334	24.1 (±4.6)	0.84	1184 (1023, 1390)	1762	30.3	0.29 (0.19, 0.39)	0.14 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1091	16.2 (±1.8)	0.88	653 (602, 712)	913	20.4	0.26 (0.20, 0.31)	-0.18 (.058)
3. All concentrations, by station (B-1)								
Station 1	206	21.8 (±6.2)	0.82	1053 (876, 1296)	1522	26.7	0.11 (-0.02, 0.24)	0.15 (.134)
Station 2	179	13.4 (±4.0)	0.86	632 (519, 790)	808	20.0	0.24 (0.10, 0.37)	-0.20 (.143)
Station 3	193	16.9 (±4.9)	0.88	821 (679, 1018)	1101	21.6	0.23 (0.09, 0.36)	-0.20 (.138)
Station 4	174	15.7 (±4.0)	0.84	632 (518, 793)	876	20.1	0.45 (0.32, 0.56)	0.18 (.146)
Station 5	206	12.4 (±1.7)	0.98	98 (82, 121)	252	13.1	0.33 (0.20, 0.45)	-0.20 (.134)
Station 6	133	16.5 (±5.0)	0.88	644 (514, 838)	910	21.1	0.11 (-0.06, 0.28)	-0.16 (.167)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: SCSTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[F(C_o) - F(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4005	131.5	49.1	82.4 (±5.8)	0.96 (0.88, 1.06)	-0.73 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6238	103.4	35.7	67.7 (±3.0)	10.73 (9.75, 11.80)	-0.73 (.024)
3. All concentrations, by station (B-1)						
Station 1	1465	103.2	34.1	69.1 (±7.6)	2.02 (1.81, 2.25)	-0.66 (.050)
Station 2	1151	107.1	28.9	78.2 (±9.9)	1.38 (1.23, 1.54)	-0.84 (.057)
Station 3	1032	92.1	47.8	44.3 (±11.1)	0.38 (0.34, 0.42)	-0.79 (.060)
Station 4	1232	110.2	51.4	58.8 (±9.2)	1.22 (1.09, 1.36)	-0.49 (.055)
Station 5	482	78.6	12.2	66.4 (±10.8)	1.02 (0.88, 1.18)	-0.93 (.088)
Station 6	876	115.9	23.7	92.2 (±9.8)	1.18 (1.04, 1.33)	-0.89 (.065)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	2127	94.7	40.7	53.7 (±7.4)	0.76 (0.68, 0.84)	-0.76 (.042)
2.5 to 5 m/sec	3681	105.7	31.4	74.3 (±4.9)	1.33 (1.21, 1.46)	-0.73 (.032)
>5 m/sec	430	128.5	47.7	80.8 (±15.2)	1.47 (1.24, 1.74)	-0.58 (.093)
b. Stability Group						
Class A & B	539	114.2	125.1	-11.0 (±23.0)	0.34 (0.30, 0.39)	-0.45 (.083)
Class C	1203	113.4	88.3	25.1 (±11.9)	0.66 (0.59, 0.74)	-0.49 (.055)
Class D	3325	112.7	13.6	99.1 (±4.2)	8.69 (7.90, 9.56)	-0.80 (.033)
Class E & F	1171	61.6	3.3	58.3 (±3.7)	18.04 (16.13, 20.17)	-0.91 (.056)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: SCSTER AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4005	82.4 (±7.6)	0.87	28252 (27057, 29535)	35026	129.0	0.18 (0.15, 0.21)	-0.21 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6238	67.7 (±5.9)	0.86	26358 (25459, 27310)	30937	117.4	-0.02 (-0.05, 0.00)	-0.24 (.024)
3. All concentrations, by station (B-1)								
Station 1	1465	69.1 (±13.6)	0.83	24105 (22457, 25960)	28864	117.0	-0.10 (-0.15, -0.05)	-0.20 (.050)
Station 2	1151	78.2 (±13.7)	0.92	28894 (26681, 31423)	34980	118.0	0.01 (-0.05, 0.07)	-0.29 (.057)
Station 3	1032	44.3 (±15.6)	0.88	32996 (30336, 36058)	34928	118.0	-0.00 (-0.07, 0.06)	-0.32 (.060)
Station 4	1232	58.8 (±15.0)	0.76	29879 (27662, 32401)	33321	125.0	-0.07 (-0.12, -0.01)	-0.15 (.055)
Station 5	482	66.4 (±11.9)	0.96	12853 (11382, 14662)	17239	81.9	0.12 (0.03, 0.21)	-0.31 (.088)
Station 6	876	92.2 (±12.0)	0.93	20094 (18346, 22131)	28573	121.0	0.08 (0.01, 0.15)	-0.25 (.065)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	2127	53.6 (±10.2)	0.87	30777 (29014, 32722)	33638	117.0	-0.03 (-0.07, 0.01)	-0.29 (.042)
2.5 to 5 m/sec	3681	74.3 (±7.7)	0.87	23582 (22543, 24701)	29096	116.0	-0.01 (-0.05, 0.02)	-0.23 (.032)
>5 m/sec	430	80.8 (±22.6)	0.79	26872 (23633, 30903)	33336	130.9	-0.04 (-0.13, 0.05)	-0.13 (.093)
b. Stability Group								
Class A & B	539	-10.9 (±32.0)	0.68	78059 (69566, 88383)	78032	186.0	-0.06 (-0.14, 0.03)	-0.22 (.083)
Class C	1203	25.1 (±17.4)	0.71	48016 (44413, 52121)	48607	155.0	-0.09 (-0.15, -0.04)	-0.20 (.055)
Class D	3325	99.1 (±6.4)	0.92	15178 (14476, 15937)	25000	111.6	-0.01 (-0.05, 0.02)	-0.17 (.033)
Class E & F	1171	58.3 (±5.9)	0.95	4561 (4214, 4957)	7966	63.4	-0.14 (-0.20, -0.09)	-0.26 (.056)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: SCSTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1439	108.2	39.5	68.7 (±6.5)	1.32 (1.19, 1.48)	-0.67 (.051)
2. All concentrations, all stations (paired in time and location) (B-3)	2398	85.6	30.3	55.3 (±4.4)	1.45 (1.31, 1.61)	-0.65 (.039)
3. All concentrations, by station (B-1)						
Station 1	573	85.0	28.6	56.4 (±8.8)	2.72 (2.37, 3.13)	-0.56 (.080)
Station 2	447	89.0	24.7	64.2 (±10.6)	1.81 (1.53, 2.13)	-0.77 (.091)
Station 3	402	74.9	40.5	34.3 (±11.4)	0.46 (0.38, 0.55)	-0.71 (.096)
Station 4	466	92.4	43.5	48.9 (±10.6)	1.91 (1.64, 2.23)	-0.42 (.089)
Station 5	169	67.1	11.4	55.6 (±12.5)	1.29 (1.00, 1.67)	-0.90 (.148)
Station 6	341	94.5	20.1	74.5 (±10.5)	1.47 (1.20, 1.80)	-0.84 (.104)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	575	77.8	33.4	44.5 (±9.1)	1.13 (0.98, 1.30)	-0.65 (.080)
2.5 to 5 m/sec	1450	85.8	29.9	55.9 (±5.8)	1.40 (1.25, 1.56)	-0.67 (.051)
>5 m/sec	373	96.8	27.4	69.4 (±10.0)	3.08 (2.55, 3.74)	-0.62 (.100)
b. Stability Group						
Class A & B	209	89.6	88.6	1.0 (±21.8)	0.47 (0.37, 0.59)	-0.62 (.133)
Class C	467	88.4	62.3	26.1 (±12.0)	0.96 (0.82, 1.12)	-0.40 (.089)
Class D	1314	92.8	18.4	74.5 (±5.2)	4.41 (3.95, 4.92)	-0.72 (.053)
Class E & F	408	56.9	2.4	54.5 (±5.2)	20.72 (17.32, 24.80)	-0.93 (.095)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: SCSTER AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $\{f(d) - f_n\}$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1439	68.7 (±7.5)	0.87	11839 (11023, 12759)	16548	95.0	0.26 (0.21, 0.31)	-0.18 (.051)
2. All concentrations, all stations (paired in time and location) (B-3)	2398	55.2 (±5.7)	0.83	12231 (11569, 12957)	15278	89.7	-0.01 (-0.05, 0.03)	-0.20 (.039)
3. All concentrations, by station (B-1)								
Station 1	573	56.4 (±13.1)	0.78	12969 (11597, 14627)	16126	92.1	-0.13 (-0.21, -0.05)	-0.15 (.080)
Station 2	447	64.2 (±11.8)	0.89	12339 (10877, 14150)	16441	91.4	0.05 (-0.04, 0.14)	-0.24 (.091)
Station 3	402	34.4 (±16.1)	0.82	13885 (12160, 16048)	15030	88.6	-0.03 (-0.13, 0.07)	-0.26 (.096)
Station 4	466	49.0 (±14.3)	0.74	14678 (12972, 16783)	17044	93.5	-0.09 (-0.18, -0.00)	0.11 (.089)
Station 5	169	55.6 (±10.0)	0.95	4894 (4005, 6157)	7961	65.3	0.29 (0.15, 0.42)	-0.27 (.148)
Station 6	341	74.5 (±11.1)	0.93	8308 (7197, 9729)	13831	91.5	0.16 (0.05, 0.26)	-0.21 (.104)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	575	44.5 (±10.7)	0.82	13035 (11658, 14698)	14989	89.9	-0.04 (-0.12, 0.04)	-0.23 (.080)
2.5 to 5 m/sec	1450	55.8 (±7.6)	0.84	12405 (11553, 13365)	15519	89.4	0.01 (-0.04, 0.06)	-0.20 (.051)
>5 m/sec	373	69.4 (±13.5)	0.82	9995 (8711, 11619)	14785	90.4	-0.04 (-0.14, 0.06)	-0.12 (.100)
b. Stability Group								
Class A & B	209	1.0 (±26.9)	0.63	26332 (21965, 32314)	26207	120.0	-0.03 (-0.16, 0.11)	-0.17 (.133)
Class C	467	26.1 (±16.0)	0.68	18608 (16447, 21273)	19249	103.0	-0.06 (-0.15, 0.04)	-0.15 (.089)
Class D	1314	74.5 (±6.6)	0.88	9477 (8795, 10250)	15015	89.8	-0.03 (-0.08, 0.03)	-0.15 (.053)
Class E & F	408	54.5 (±6.3)	0.97	3020 (2647, 3487)	5978	57.6	-0.12 (-0.21, -0.02)	-0.25 (.095)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: SCSTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	46.0	16.8	29.2 ($\pm$4.4)	1.72 (1.41, 2.09)	-0.53 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1138	26.7	8.2	18.5 ($\pm$1.8)	2.27 (2.03, 2.54)	-0.67 (.057)
3. All concentrations, by station (B-1)						
Station 1	238	29.4	8.9	20.6 ($\pm$4.2)	3.25 (2.60, 4.08)	-0.58 (.125)
Station 2	228	26.8	6.2	20.6 ($\pm$3.8)	2.66 (2.12, 3.33)	-0.78 (.127)
Station 3	187	24.0	10.9	13.1 ($\pm$4.7)	0.69 (0.54, 0.88)	-0.70 (.144)
Station 4	203	31.0	13.4	17.6 ($\pm$5.4)	3.34 (2.65, 4.21)	-0.46 (.135)
Station 5	120	16.1	2.0	14.0 ($\pm$3.2)	3.04 (2.24, 4.13)	0.93 (.176)
Station 6	162	28.3	5.0	23.3 ($\pm$4.0)	3.93 (3.02, 5.12)	-0.77 (.151)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: SCSTER AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference $(C_o - C_p)$ $(\mu g/m^3)$	Bias: Fraction of Positive Residuals $(C_o > C_p)$	Characteristic Discrepancies: Noise (Variance) $(\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability $(\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference $(\mu g/m^3)$	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	29.2 (±3.9)	0.90	1104 (959, 1289)	1952	34.1	0.39 (0.30, 0.47)	0.11 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1138	18.5 (±1.9)	0.88	787 (726, 856)	1130	23.7	0.24 (0.18, 0.29)	-0.17 (.057)
3. All concentrations, by station (B-1)								
Station 1	238	20.6 (±4.8)	0.85	975 (822, 1180)	1394	26.0	0.12 (-0.00, 0.25)	0.15 (.125)
Station 2	228	20.7 (±3.6)	0.93	627 (527, 762)	1052	24.1	0.30 (0.18, 0.41)	-0.17 (.127)
Station 3	187	13.0 (±5.0)	0.82	928 (767, 1153)	1095	23.2	0.15 (0.00, 0.29)	-0.19 (.141)
Station 4	203	17.6 (±5.4)	0.81	1094 (910, 1347)	1400	25.1	0.34 (0.22, 0.46)	0.16 (.135)
Station 5	120	14.0 (±2.3)	0.98	167 (132, 220)	302	14.0	0.55 (0.41, 0.66)	0.20 (.176)
Station 6	162	23.3 (±3.9)	0.92	588 (479, 743)	1126	25.4	0.16 (0.00, 0.30)	-0.13 (.151)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 3141 AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_O - C_p$ ($\mu g/m^3$)	Variance Comparison S_O^2/S_p^2	Frequency Distribution Comparison $[f(C_O) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3583	114.9	43.6	71.3 (±5.1)	1.79 (1.62, 1.96)	-0.63 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5673	91.4	35.1	56.3 (±3.6)	1.83 (1.67, 2.02)	-0.63 (.026)
3. All concentrations, by station (B-1)						
Station 1	1397	92.7	32.9	59.8 (±6.5)	2.82 (2.53, 3.15)	-0.52 (.051)
Station 2	850	99.9	45.1	54.8 (±10.4)	1.42 (1.25, 1.61)	-0.60 (.066)
Station 3	1049	90.9	33.0	57.9 (±9.2)	1.51 (1.35, 1.69)	-0.75 (.059)
Station 4	982	101.0	52.9	48.1 (±9.1)	1.93 (1.72, 2.17)	-0.32 (.061)
Station 5	711	58.3	12.3	46.0 (±5.6)	0.73 (0.64, 0.83)	-0.89 (.072)
Station 6	684	98.9	28.9	70.0 (±10.8)	2.77 (2.43, 3.16)	-0.74 (.074)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	2340	85.6	35.8	49.8 (±5.7)	1.45 (1.31, 1.60)	-0.66 (.040)
2.5 to 5 m/sec	2847	90.3	34.2	56.1 (±4.8)	1.85 (1.68, 2.04)	-0.60 (.036)
>5 m/sec	486	124.0	37.7	86.3 (±13.2)	6.17 (5.33, 7.14)	-0.43 (.087)
b. Stability Group						
Class A & B	654	88.6	104.8	-16.2 (±10.2)	0.69 (0.62, 0.77)	-0.24 (.075)
Class C	1068	101.9	81.0	20.9 (±7.5)	1.54 (1.39, 1.71)	-0.24 (.059)
Class D	2867	99.5	13.7	85.8 (±2.8)	11.16 (10.15, 12.28)	-0.75 (.036)
Class E & F	1084	61.1	4.7	56.4 (±3.6)	40.27 (36.33, 44.63)	-0.84 (.058)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 3141 AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3583	71.3 (±7.6)	0.84	19836 (18951, 20791)	24916	108.0	-0.20 (-0.23, -0.17)	-0.18 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5673	56.2 (±5.4)	0.82	18234 (17583, 18926)	21393	99.2	0.03 (0.01, 0.06)	-0.20 (.026)
3. All concentrations, by station (B-1)								
Station 1	1397	59.8 (±11.5)	0.78	16023 (14902, 17288)	19586	99.5	-0.05 (-0.10, -0.00)	0.14 (.051)
Station 2	850	54.8 (±15.9)	0.82	23773 (21675, 26223)	26744	113.0	0.01 (-0.06, 0.08)	-0.22 (.066)
Station 3	1049	57.9 (±14.2)	0.86	22865 (21036, 24969)	26202	104.0	0.00 (-0.06, 0.06)	-0.26 (.059)
Station 4	982	48.5 (±11.8)	0.72	19415 (17813, 21266)	21745	104.0	0.09 (0.02, 0.15)	0.10 (.061)
Station 5	711	46.0 (±7.1)	0.94	5484 (4958, 6107)	7592	63.0	0.07 (-0.00, 0.14)	-0.33 (.072)
Station 6	684	70.0 (±17.5)	0.86	20030 (18076, 22353)	24900	104.0	0.04 (-0.03, 0.12)	-0.22 (.074)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	2340	50.0 (±8.6)	0.83	19608 (18535, 20787)	22100	99.1	0.02 (-0.02, 0.06)	-0.24 (.040)
2.5 to 5 m/sec	2847	56.2 (±7.0)	0.82	15957 (15162, 16823)	19108	94.4	0.07 (0.03, 0.11)	-0.19 (.036)
>5 m/sec	486	86.5 (±24.8)	0.76	23935 (21205, 27288)	31374	127.0	-0.12 (-0.20, -0.03)	0.11 (.087)
b. Stability Group								
Class A & B	654	-16.2 (±20.3)	0.56	33659 (30307, 37661)	33869	130.0	0.05 (-0.03, 0.13)	-0.13 (.075)
Class C	1068	20.9 (±15.2)	0.63	31683 (29169, 34570)	32091	125.0	0.00 (-0.06, 0.06)	0.12 (.059)
Class D	2867	85.8 (± 6.1)	0.91	11318 (10756, 11930)	18684	96.6	0.03 (-0.01, 0.07)	-0.16 (.036)
Class E & F	1084	56.4 (±8.5)	0.92	7317 (6741, 7978)	10490	61.6	-0.08 (-0.14, -0.02)	-0.26 (.058)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 3141 AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1252	96.1	35.7	60.4 ($\pm$6.1)	2.06 (1.84, 2.30)	-0.61 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2132	76.5	29.8	46.7 ($\pm$4.1)	2.07 (1.87, 2.29)	-0.56 (.042)
3. All concentrations, by station (B-1)						
Station 1	531	78.7	27.7	51.0 ($\pm$7.7)	3.45 (3.00, 3.96)	-0.47 (.083)
Station 2	336	79.5	36.5	43.0 ($\pm$11.5)	1.49 (1.22, 1.83)	-0.55 (.105)
Station 3	403	75.0	27.2	47.8 ($\pm$10.4)	1.80 (1.50, 2.16)	-0.68 (.096)
Station 4	361	86.4	45.1	41.3 ($\pm$10.5)	2.23 (1.83, 2.71)	-0.32 (.101)
Station 5	237	51.0	11.9	39.1 ($\pm$6.9)	0.71 (0.56, 0.88)	-0.87 (.125)
Station 6	264	80.2	24.4	55.8 ($\pm$11.7)	2.93 (2.35, 3.66)	-0.68 (.118)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	592	73.7	26.7	47.0 ($\pm$7.8)	1.89 (1.64, 2.17)	-0.61 (.079)
2.5 to 5 m/sec	1268	73.5	31.6	41.9 ($\pm$5.3)	1.73 (1.55, 1.94)	-0.56 (.054)
>5 m/sec	272	96.8	28.1	68.7 ($\pm$12.3)	6.12 (4.91, 7.63)	-0.50 (.117)
b. Stability Group						
Class A & B	226	68.9	82.3	-13.4 ($\pm$16.2)	0.93 (0.74, 1.16)	0.19 (.128)
Class C	443	83.9	57.0	26.9 ($\pm$11.1)	1.73 (1.47, 2.04)	-0.28 (.091)
Class D	1133	80.6	16.3	64.3 ($\pm$4.7)	6.36 (5.68, 7.11)	-0.68 (.057)
Class E & F	330	58.1	3.4	54.7 ($\pm$6.7)	40.92 (33.32, 50.27)	-0.91 (.106)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 3141 AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability ($\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1252	60.4 (±7.5)	0.85	9284 (8600, 10061)	12927	83.0	0.26 (0.21, 0.31)	-0.15 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2132	46.8 (±5.4)	0.80	8704 (8206, 9253)	10889	75.9	0.08 (0.04, 0.12)	-0.16 (.042)
3. All concentrations, by station (B-1)								
Station 1	531	51.0 (±11.6)	0.76	8538 (7603, 9677)	11122	78.5	-0.05 (-0.14, 0.03)	-0.10 (.083)
Station 2	336	43.0 (±14.3)	0.79	11148 (9647, 13071)	12966	83.0	-0.04 (-0.15, 0.07)	-0.19 (.105)
Station 3	403	47.9 (±13.9)	0.84	10868 (9519, 12559)	12966	83.0	-0.04 (-0.14, 0.06)	-0.19 (.096)
Station 4	361	41.4 (±11.2)	0.71	8415 (7318, 9808)	10103	76.0	0.21 (0.11, 0.31)	0.07 (.101)
Station 5	237	39.1 (±7.8)	0.93	2590 (2183, 3136)	4108	52.5	0.12 (-0.01, 0.24)	-0.30 (.125)
Station 6	264	55.8 (±17.1)	0.82	8434 (7171, 10105)	11517	77.6	0.13 (0.01, 0.24)	-0.16 (.118)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	592	47.0 (±9.8)	0.81	8678 (7773, 9768)	10876	76.3	0.07 (-0.01, 0.15)	-0.18 (.079)
2.5 to 5 m/sec	1268	42.0 (±6.8)	0.79	8196 (7596, 8877)	9950	72.9	0.11 (0.05, 0.16)	-0.17 (.054)
>5 m/sec	272	68.7 (±16.2)	0.80	10612 (9043, 12678)	15297	88.9	0.02 (-0.10, 0.13)	0.13 (.117)
b. Stability Group								
Class A & B	226	-13.3 (±17.0)	0.50	12842 (10783, 15628)	12964	85.1	0.17 (0.04, 0.29)	0.09 (.128)
Class C	443	26.9 (±13.8)	0.63	13473 (11871, 15461)	14165	86.8	0.06 (-0.03, 0.15)	0.12 (.091)
Class D	1133	64.3 (±6.1)	0.87	6240 (5758, 6791)	10367	75.4	0.08 (0.02, 0.13)	0.14 (.057)
Class E & F	330	54.7 (±10.0)	0.96	3889 (3361, 4567)	6864	56.6	0.01 (-0.10, 0.12)	-0.25 (.106)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 3141 AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $\lvert f(C_o) - f(C_p) \rvert$ max (fraction)
1. Highest concentration, event-by-event (A-1)	337	38.3	14.4	23.9 (±4.1)	3.12 (2.55, 3.83)	-0.49 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1116	22.6	7.5	15.1 (±1.7)	3.32 (2.97, 3.72)	-0.62 (.058)
3. All concentrations, by station (B-1)						
Station 1	211	29.0	9.2	19.8 (±4.6)	6.11 (4.86, 7.69)	-0.45 (.132)
Station 2	183	21.6	8.5	13.1 (±3.9)	2.20 (1.72, 2.82)	-0.60 (.142)
Station 3	196	24.1	7.6	16.6 (±4.3)	2.87 (2.26, 3.63)	-0.72 (.137)
Station 4	179	25.7	12.4	13.3 (±4.7)	3.11 (2.42, 4.00)	-0.42 (.144)
Station 5	209	13.5	1.8	11.7 (±1.6)	2.07 (1.64, 2.60)	-0.91 (.133)
Station 6	138	21.4	5.9	15.5 (±4.3)	3.70 (2.78, 4.92)	-0.64 (.164)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 3141 AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - t_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	337	23.9 (±4.2)	0.86	991 (858, 1162)	1557	28.0	0.39 (0.29, 0.47)	-0.14 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1116	15.1 (±1.8)	0.85	601 (554, 654)	209	19.1	0.30 (0.24, 0.35)	0.17 (.058)
3. All concentrations, by station (B-1)								
Station 1	211	19.8 (±6.2)	0.79	1026 (857, 1258)	1411	25.4	0.14 (0.01, 0.27)	0.15 (.132)
Station 2	183	13.1 (±3.8)	0.83	566 (467, 705)	735	18.7	0.24 (0.10, 0.37)	0.16 (.142)
Station 3	196	16.6 (±4.8)	0.87	798 (662, 986)	1068	20.8	0.19 (0.05, 0.32)	0.18 (.137)
Station 4	179	13.3 (±3.6)	0.82	488 (401, 610)	662	17.3	0.61 (0.50, 0.69)	0.18 (.144)
Station 5	209	11.8 (±1.8)	0.96	98 (82, 121)	236	12.6	0.31 (0.18, 0.43)	-0.18 (.133)
Station 6	138	15.5 (±4.9)	0.83	584 (468, 755)	820	19.6	0.12 (-0.05, 0.28)	0.16 (.164)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 3141 AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (Fraction)
1. Highest concentration, event-by-event (A-1)	4131	127.6	44.7	82.9 (±4.9)	1.90 (1.73, 2.09)	-0.60 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6595	98.0	35.9	62.1 (±3.4)	1.94 (1.76, 2.13)	-0.59 (.024)
3. All concentrations, by station (B-1)						
Station 1	1582	96.0	34.1	61.9 (±6.6)	3.80 (3.40, 4.21)	-0.47 (.048)
Station 2	1198	103.0	29.6	73.4 (±8.7)	2.37 (2.12, 2.65)	-0.74 (.056)
Station 3	1087	87.6	44.7	42.9 (±8.8)	0.70 (0.62, 0.78)	-0.70 (.058)
Station 4	1336	102.1	52.6	49.5 (±7.8)	2.20 (1.98, 2.45)	-0.27 (.053)
Station 5	497	76.3	15.0	61.3 (±9.3)	1.92 (1.67, 2.21)	-0.83 (.086)
Station 6	895	113.5	23.6	89.9 (±8.6)	2.24 (1.98, 2.53)	-0.83 (.064)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	2266	88.8	40.9	47.9 (±6.1)	1.37 (1.23, 1.52)	-0.62 (.040)
2.5 to 5 m/sec	3872	100.7	32.1	68.6 (±4.3)	2.32 (2.11, 2.56)	-0.60 (.031)
>5 m/sec	457	121.1	43.7	77.4 (±12.9)	3.63 (3.10, 4.24)	-0.42 (.090)
b. Stability Group						
Class A & B	617	100.0	107.7	-7.7 (±16.0)	0.77 (0.67, 0.88)	-0.22 (.077)
Class C	1333	102.8	86.0	16.8 (±9.3)	1.26 (1.12, 1.41)	-0.29 (.053)
Class D	3449	108.8	14.9	94.0 (±4.0)	15.40 (14.00, 16.94)	-0.70 (.033)
Class E & F	1196	60.4	3.9	56.5 (±3.7)	24.06 (21.68, 26.71)	-0.86 (.056)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 3141 AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4131	82.8 (±7.1)	0.84	21169 (20287, 22115)	28027	117.9	0.19 (0.16, 0.22)	-0.16 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6595	62.1 (±5.5)	0.81	20390 (19713, 21106)	24242	107.5	-0.02 (-0.04, 0.01)	-0.18 (.024)
3. All concentrations, by station (B-1)								
Station 1	1582	61.9 (±12.8)	0.75	19698 (18399, 21153)	23517	106.1	-0.11 (-0.16, -0.06)	0.15 (.048)
Station 2	1198	73.4 (±13.2)	0.88	23565 (21793, 25584)	28934	112.4	0.00 (-0.05, 0.06)	-0.24 (.056)
Station 3	1087	42.9 (±13.8)	0.82	23162 (21340, 25253)	24983	111.0	-0.06 (-0.12, -0.01)	-0.26 (.058)
Station 4	1336	49.5 (±13.0)	0.69	21845 (20285, 23611)	24277	107.8	-0.03 (-0.08, 0.02)	0.12 (.053)
Station 5	497	61.3 (±11.1)	0.92	9933 (8812, 11307)	13672	77.8	0.11 (0.02, 0.20)	-0.27 (.086)
Station 6	895	89.9 (±11.7)	0.91	16107 (14719, 17721)	24163	115.4	0.06 (-0.01, 0.13)	-0.21 (.064)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	2226	47.9 (±9.2)	0.81	22571 (21306, 23963)	24856	106.9	-0.04 (-0.08, 0.01)	-0.22 (.040)
2.5 to 5 m/sec	3872	68.6 (±7.3)	0.82	18917 (18104, 19791)	23616	106.6	-0.01 (-0.04, 0.02)	-0.17 (.031)
>5 m/sec	457	77.4 (±20.6)	0.75	20564 (18160, 23534)	26504	118.5	-0.06 (-0.15, 0.03)	0.10 (.090)
b. Stability Group								
Class A & B	617	-7.6 (±23.7)	0.57	43254 (38830, 48563)	43242	151.1	-0.05 (-0.13, 0.03)	-0.12 (.077)
Class C	1333	16.8 (±15.1)	0.62	32618 (30286, 35258)	32876	132.5	-0.08 (-0.13, -0.03)	-0.11 (.053)
Class D	3449	94.0 (±6.4)	0.88	14440 (13784, 15149)	23270	106.0	-0.02 (-0.05, 0.01)	0.16 (.033)
Class E & F	1196	56.5 (±6.0)	0.94	4427 (4094, 4807)	7620	61.7	-0.13 (-0.19, -0.07)	-0.24 (.056)

TABLE B. (PART I) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 3141 AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1469	106.1	36.3	69.8 (±5.8)	2.44 (2.18, 2.73)	-0.58 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2509	82.0	30.7	51.3 (±3.9)	2.39 (2.17, 2.63)	-0.54 (.038)
3. All concentrations, by station (B-1)						
Station 1	599	81.6	29.0	52.6 (±8.1)	4.50 (3.91, 5.17)	-0.43 (.079)
Station 2	465	85.6	25.2	60.4 (±9.6)	2.82 (2.41, 3.30)	-0.68 (.089)
Station 3	430	70.3	37.4	32.9 (±9.2)	0.82 (0.70, 0.97)	-0.60 (.093)
Station 4	492	88.0	45.8	42.2 (±9.6)	2.99 (2.60, 3.44)	-0.26 (.087)
Station 5	172	66.1	13.9	52.2 (±11.3)	2.13 (1.65, 2.75)	-0.82 (.147)
Station 6	351	91.9	19.8	72.1 (±9.4)	2.67 (2.19, 3.26)	-0.75 (.103)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	611	73.5	34.7	38.8 (±8.0)	1.77 (1.54, 2.04)	-0.52 (.078)
2.5 to 5 m/sec	1514	82.4	29.9	52.5 (±5.1)	2.37 (2.13, 2.63)	-0.56 (.049)
>5 m/sec	384	94.1	27.4	66.7 (±9.5)	4.84 (4.00, 5.86)	-0.52 (.098)
b. Stability Group						
Class A & B	228	82.5	79.5	3.0 (±16.7)	0.99 (0.78, 1.24)	-0.23 (.127)
Class C	509	81.5	62.1	19.4 (±10.1)	1.64 (1.42, 1.88)	-0.24 (.085)
Class D	1359	90.0	19.2	70.8 (±4.9)	7.29 (6.51, 8.16)	-0.62 (.052)
Class E & F	413	56.2	3.0	53.2 (±5.2)	28.94 (24.11, 34.72)	-0.90 (.095)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 3141 AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference $(C_o - C_p)$ $(\mu g/m^3)$	Bias: Fraction of Positive Residuals $(C_o > C_p)$	Characteristic Discrepancies: Noise (Variance) $(\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability $(\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference $(\mu g/m^3)$	Correlation Coefficient	Frequency Distribution Normality Test $\lvert f(d) - f_n \rvert$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1469	69.8 (±6.8)	0.86	9883 (9208, 10642)	14755	90.0	0.26 (0.21, 0.31)	0.14 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2509	51.3 (±5.2)	0.79	10159 (9621, 10748)	12790	83.0	-0.01 (-0.05, 0.03)	-0.15 (.038)
3. All concentrations, by station (B-1)								
Station 1	599	52.5 (±11.9)	0.74	11221 (10058, 12621)	13962	84.9	-0.13 (-0.21, -0.05)	0.13 (.079)
Station 2	465	60.5 (±11.0)	0.85	10987 (9703, 12573)	14618	86.9	0.03 (-0.06, 0.12)	-0.19 (.089)
Station 3	430	32.9 (±14.2)	0.89	10251 (9010, 11797)	11308	80.8	-0.08 (-0.17, 0.01)	-0.20 (.093)
Station 4	492	42.2 (±12.8)	0.69	11582 (10262, 13202)	13337	83.4	0.01 (-0.08, 0.10)	0.11 (.087)
Station 5	172	52.3 (±10.3)	0.91	4311 (3530, 5418)	7018	62.9	0.26 (0.11, 0.39)	-0.22 (.147)
Station 6	351	72.1 (±10.9)	0.91	7059 (6123, 8250)	12243	86.8	0.15 (0.05, 0.25)	-0.18 (.103)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	611	38.8 (±10.0)	0.75	10589 (9501, 11896)	12079	81.9	-0.04 (-0.12, 0.04)	-0.17 (.078)
2.5 to 5 m/sec	1514	52.5 (±6.9)	0.80	10215 (9527, 10988)	12962	82.9	0.01 (-0.04, 0.06)	-0.15 (.049)
>5 m/sec	384	66.7 (±13.0)	0.82	8817 (7694, 10235)	13240	85.4	0.00 (-0.10, 0.10)	0.11 (.098)
b. Stability Group								
Class A & B	228	3.0 (±21.9)	0.55	16995 (14269, 20684)	16930	100.9	-0.04 (-0.17, 0.09)	-0.08 (.127)
Class C	509	19.4 (±13.6)	0.61	14204 (12618, 16143)	14552	91.9	-0.04 (-0.13, 0.05)	-0.10 (.085)
Class D	1359	70.8 (±6.3)	0.85	8569 (7962, 9255)	13575	84.8	0.00 (-0.05, 0.06)	0.13 (.052)
Class E & F	413	53.3 (±6.4)	0.96	2918 (2558, 3368)	5748	56.4	-0.07 (-0.17, 0.03)	-0.22 (.095)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 3141 AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	46.0	16.1	29.9 (±4.1)	2.67 (2.19, 3.26)	-0.47 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1161	26.2	8.7	17.5 (±1.8)	3.01 (1.52, 5.96)	-0.59 (.056)
3. All concentrations, by station (B-1)						
Station 1	240	29.2	9.6	19.6 (±4.1)	4.12 (3.30, 5.15)	-0.48 (.124)
Station 2	234	26.2	6.5	19.7 (±3.6)	3.63 (2.90, 4.54)	-0.70 (.126)
Station 3	193	23.3	10.3	13.0 (±4.1)	1.13 (0.89, 1.44)	-0.60 (.138)
Station 4	208	30.4	14.9	15.5 (±5.3)	3.64 (2.89, 4.59)	-0.36 (.133)
Station 5	121	15.9	2.7	13.2 (±3.1)	4.23 (3.11, 5.76)	-0.88 (.175)
Station 6	165	27.8	5.2	22.6 (±3.9)	5.67 (4.36, 7.38)	-0.68 (.150)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 3141 AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Bias		Performance Measures - Paired Comparisons				
				Characteristic Discrepancies				
		Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Fraction of Positive Residuals ($C_o > C_p$)	Noise (Variance) ($\mu g/m^3$)^2	Gross Variability ($\mu g/m^3$)^2	Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	29.9 (±3.6)	0.92	924 (802, 1079)	1815	32.9	0.45 (0.36, 0.53)	0.12 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	[illegible]	[illegible] (±1.8)	0.85	691 (638, 751)	998	22.2	0.30 (0.25, 0.35)	0.14 (.056)
3. All concentrations, by station (B-1)								
Station 1	240	19.6 (±4.6)	0.83	885 (746, 1071)	1265	24.8	0.18 (0.05, 0.30)	0.16 (.124)
Station 2	234	19.7 (±3.5)	0.89	584 (491, 709)	970	22.7	0.32 (0.20, 0.43)	0.15 (.126)
Station 3	193	13.0 (±4.6)	0.80	747 (618, 926)	912	21.6	0.11 (-0.03, 0.25)	-0.17 (.138)
Station 4	208	15.4 (±4.8)	0.77	879 (732, 1080)	1113	22.2	0.50 (0.39, 0.60)	0.17 (.133)
Station 5	121	13.3 (±2.4)	0.96	179 (141, 236)	354	14.0	0.49 (0.34, 0.61)	-0.20 (.175)
Station 6	165	22.6 (±3.8)	0.92	566 (462, 715)	1073	24.6	0.15 (0.00, 0.30)	0.13 (.150)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 4141 AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Variance Comparison S_o^2/S_p^2	Performance Measures - Unpaired Comparisons: Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3615	114.0	46.2	67.8 (±5.1)	1.77 (1.61, 1.95)	-0.60 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5727	90.6	36.7	53.9 (±3.6)	1.81 (1.65, 2.00)	-0.59 (.025)
3. All concentrations, by station (B-1)						
Station 1	1415	91.6	36.2	55.4 (±6.5)	2.63 (2.35, 2.93)	-0.49 (.051)
Station 2	855	99.3	45.0	54.3 (±10.4)	1.42 (1.26, 1.62)	-0.59 (.066)
Station 3	1049	90.9	33.0	57.9 (±9.2)	1.51 (1.35, 1.69)	-0.75 (.059)
Station 4	1013	98.4	56.6	41.8 (±8.9)	1.96 (1.75, 2.20)	-0.26 (.060)
Station 5	711	58.3	12.3	46.0 (±5.6)	0.73 (0.64, 0.83)	-0.89 (.072)
Station 6	684	98.9	28.9	70.0 (±10.8)	2.77 (2.43, 3.16)	-0.74 (.074)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	2365	85.0	37.0	48.0 (±5.7)	1.44 (1.30, 1.59)	-0.65 (.040)
2.5 to 5 m/sec	2876	89.4	36.2	53.2 (±4.8)	1.82 (1.65, 2.01)	-0.57 (.036)
>5 m/sec	486	124.0	37.7	86.3 (±13.2)	6.17 (5.33, 7.14)	-0.43 (.087)
b. Stability Group						
Class A & B	654	88.6	104.7	-16.1 (±14.4)	0.69 (0.60, 0.79)	-0.24 (.075)
Class C	1068	101.9	81.0	20.9 (±10.7)	1.54 (1.37, 1.72)	-0.30 (.059)
Class D	2867	99.5	13.7	85.8 (±3.9)	11.17 (10.15, 12.31)	-0.75 (.036)
Class E & F	1138	58.5	14.1	44.4 (±5.2)	5.84 (5.22, 6.54)	-0.73 (.057)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 4141 AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability ($\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $\lvert f(d) - f_n \rvert$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3614	67.7 (±7.7)	0.82	20074 (19182, 21036)	24656	108.0	0.19 (0.16, 0.22)	-0.17 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5727	53.9 (±5.5)	0.81	18391 (17737, 19085)	21288	99.3	0.02 (-0.00, 0.05)	-0.19 (.025)
3. All concentrations, by station (B-1)								
Station 1	1415	55.4 (±11.7)	0.76	16619 (15464, 17922)	19676	101.0	-0.08 (-0.13, -0.03)	-0.14 (.051)
Station 2	855	54.3 (±15.7)	0.81	23668 (21585, 26099)	26586	113.0	-0.01 (-0.08, 0.06)	-0.22 (.066)
Station 3	1049	57.9 (±14.2)	0.86	22863 (21034, 24966)	26195	104.0	0.00 (-0.06, 0.06)	-0.26 (.059)
Station 4	1013	41.8 (±11.7)	0.68	19439 (17858, 21261)	21163	103.0	0.07 (0.01, 0.13)	0.09 (.060)
Station 5	711	46.0 (±7.1)	0.97	5484 (4958, 6107)	7552	63.0	0.07 (-0.00, 0.14)	-0.33 (.072)
Station 6	684	70.0 (±17.5)	0.86	20030 (18076, 22353)	24900	104.0	0.04 (-0.03, 0.12)	-0.22 (.074)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	2365	47.9 (±8.6)	0.82	19758 (18682, 20939)	22041	99.4	0.01 (-0.03, 0.05)	-0.24 (.040)
2.5 to 5 m/sec	2876	53.2 (±7.1)	0.81	16135 (15335, 17006)	18965	94.6	0.06 (0.02, 0.10)	0.18 (.036)
>5 m/sec	486	86.5 (±24.7)	0.76	23935 (21205, 27288)	31374	127.2	-0.12 (-0.20, -0.03)	0.11 (.087)
b. Stability Group								
Class A & B	654	-16.2 (±20.3)	0.56	33659 (30307, 37661)	33869	130.0	0.05 (-0.03, 0.13)	-0.13 (.075)
Class C	1068	20.9 (±15.3)	0.63	31683 (29169, 34570)	32091	125.0	0.00 (-0.06, 0.06)	-0.11 (.059)
Class D	2867	85.8 (±6.1)	0.91	11318 (10756, 11930)	18684	96.6	0.03 (-0.01, 0.07)	-0.16 (.036)
Class E & F	1138	44.4 (±8.9)	0.86	8519 (7863, 9269)	10480	64.3	-0.10 (-0.16, -0.05)	-0.26 (.057)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 4141 AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_P ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_O - \bar{C}_P$ ($\mu g/m^3$)	Variance Comparison S_O^2/S_P^2	Frequency Distribution Comparison $[f(C_O) - f(C_P)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1281	94.1	37.7	56.4 (±6.0)	2.08 (1.87, 2.33)	-0.54 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2179	75.0	30.9	44.1 (±4.1)	2.08 (1.87, 2.30)	-0.52 (.041)
3. All concentrations, by station (B-1)						
Station 1	553	75.8	30.0	45.8 (±7.5)	3.36 (2.92, 3.86)	-0.40 (.082)
Station 2	336	79.5	36.6	42.9 (±11.5)	1.49 (1.22, 1.83)	-0.55 (.105)
Station 3	403	75.0	27.2	47.8 (±10.4)	1.80 (1.56, 2.08)	-0.68 (.096)
Station 4	386	81.4	47.0	34.4 (±10.0)	2.36 (1.95, 2.84)	-0.21 (.098)
Station 5	237	51.0	11.9	39.1 (±6.9)	0.71 (0.56, 0.88)	-0.87 (.125)
Station 6	264	80.2	24.4	55.8 (±11.7)	2.93 (2.35, 3.66)	-0.68 (.118)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	661	71.5	27.4	44.1 (±7.3)	1.92 (1.68, 2.19)	-0.55 (.079)
2.5 to 5 m/sec	1296	72.1	33.1	39.0 (±5.2)	1.74 (1.55, 1.94)	-0.51 (.053)
>5 m/sec	272	96.8	28.1	68.7 (±12.3)	6.12 (4.91, 7.63)	-0.30 (.117)
b. Stability Group						
Class A & B	226	68.9	82.3	-13.4 (±16.2)	0.93 (0.74, 1.16)	-0.15 (.128)
Class C	443	83.9	57.0	26.9 (±11.1)	1.73 (1.47, 2.04)	-0.26 (.091)
Class D	1142	80.0	16.8	63.2 (±4.7)	6.26 (5.60, 7.00)	-0.66 (.057)
Class E & F	368	52.8	11.6	41.2 (±6.6)	6.30 (5.20, 7.65)	-0.69 (.100)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 4141 AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1281	56.4 (±7.4)	0.82	9339 (8659, 10111)	12512	81.3	0.25 (0.20, 0.30)	-0.13 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2179	44.2 (±5.3)	0.78	8715 (8221, 9259)	10663	75.0	0.07 (0.03, 0.12)	-0.15 (.041)
3. All concentrations, by station (B-1)								
Station 1	553	45.7 (±11.6)	0.72	8697 (7762, 9831)	10771	77.3	-0.08 (-0.16, 0.01)	0.10 (.082)
Station 2	336	42.9 (±14.3)	0.79	11148 (9647, 13071)	12957	82.9	0.04 (-0.07, 0.15)	-0.18 (.105)
Station 3	403	47.8 (±13.9)	0.84	10865 (9517, 12555)	13124	79.0	0.04 (-0.06, 0.13)	-0.23 (.096)
Station 4	386	34.4 (±10.8)	0.66	8216 (7176, 9526)	9380	72.6	0.21 (0.11, 0.30)	0.07 (.098)
Station 5	237	39.1 (±7.8)	0.93	2590 (2183, 3136)	4108	52.5	0.12 (-0.01, 0.24)	-0.30 (.125)
Station 6	264	55.8 (±17.1)	0.82	8434 (7171, 10105)	11517	77.6	0.13 (0.01, 0.24)	-0.16 (.118)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	611	44.1 (±9.7)	0.78	8645 (7757, 9712)	10575	75.0	0.06 (-0.02, 0.14)	-0.17 (.078)
2.5 to 5 m/sec	1296	39.1 (±6.8)	0.77	8212 (7617, 8887)	9732	72.1	0.10 (0.04, 0.15)	-0.15 (.053)
>5 m/sec	272	68.7 (±16.2)	0.80	10612 (9043, 12678)	15296	88.9	0.02 (-0.10, 0.13)	0.13 (.117)
b. Stability Group								
Class A & B	226	-13.4 (±16.9)	0.50	12842 (10783, 15628)	12964	85.1	0.17 (0.04, 0.29)	0.09 (.128)
Class C	443	26.9 (±14.1)	0.63	13473 (11871, 15461)	14165	86.8	0.06 (-0.03, 0.15)	0.12 (.091)
Class D	1142	63.2 (± 6.2)	0.87	6292 (5808, 6845)	10282	75.0	0.07 (0.01, 0.12)	0.14 (.057)
Class E & F	368	41.3 (±10.1)	0.85	4522 (3937, 5263)	6214	54.6	-0.10 (-0.20, 0.00)	-0.20 (.100)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 4141 AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	337	38.3	15.2	23.1 ($\pm$4.1)	3.00 (2.45, 3.68)	-0.47 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1126	22.4	7.9	14.5 ($\pm$1.7)	3.18 (2.84, 3.55)	-0.60 (.057)
3. All concentrations, by station (B-1)						
Station 1	213	28.7	10.1	18.6 ($\pm$4.6)	5.51 (4.38, 6.93)	-0.40 (.132)
Station 2	183	21.6	8.6	13.0 ($\pm$3.9)	2.19 (1.71, 2.80)	-0.59 (.142)
Station 3	196	24.1	7.6	16.5 ($\pm$4.3)	2.87 (2.27, 3.63)	-0.72 (.137)
Station 4	187	24.7	13.1	11.6 ($\pm$4.6)	2.94 (2.30, 3.76)	-0.35 (.141)
Station 5	209	13.5	1.8	11.7 ($\pm$1.6)	2.07 (1.64, 2.60)	-0.91 (.133)
Station 6	138	21.4	5.9	15.5 ($\pm$4.3)	3.70 (2.78, 4.92)	-0.64 (.164)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: 4141 AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	337	23.1 (±4.1)	0.86	953 (825, 1117)	1482	27.3	0.42 (0.33, 0.50)	0.13 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1126	14.5 (±1.8)	0.84	596 (550, 649)	806	18.8	0.31 (0.26, 0.36)	0.17 (.057)
3. All concentrations, by station (B-1)								
Station 1	213	18.6 (±4.7)	0.77	1021 (853, 1250)	1363	24.9	0.16 (0.03, 0.29)	0.15 (.132)
Station 2	183	13.0 (±4.2)	0.83	567 (467, 706)	734	18.8	0.24 (0.09, 0.37)	0.16 (.142)
Station 3	196	16.6 (±4.5)	0.87	797 (661, 985)	1068	20.8	0.19 (0.05, 0.32)	0.18 (.137)
Station 4	187	11.5 (±4.2)	0.76	465 (384, 578)	596	16.3	0.62 (0.52, 0.70)	0.18 (.141)
Station 5	209	11.8 (±1.6)	0.96	98 (82, 121)	236	12.6	0.31 (0.18, 0.43)	-0.18 (.133)
Station 6	138	15.5 (±4.8)	0.83	584 (468, 755)	820	19.6	0.12 (-0.05, 0.28)	0.16 (.164)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 4141 AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4162	126.7	47.0	79.7 (±4.9)	1.89 (1.72, 2.08)	-0.58 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6661	97.1	37.2	59.9 (±3.4)	1.92 (1.75, 2.12)	-0.57 (.024)
3. All concentrations, by station (B-1)						
Station 1	1598	95.1	36.9	58.2 (±6.6)	3.51 (3.15, 3.92)	-0.45 (.048)
Station 2	1207	102.3	29.7	72.6 (±8.7)	2.37 (2.12, 2.65)	-0.73 (.055)
Station 3	1087	87.6	44.7	42.9 (±8.8)	0.70 (0.62, 0.78)	-0.70 (.058)
Station 4	1377	99.2	55.0	44.2 (±7.6)	2.24 (2.00, 2.50)	-0.22 (.052)
Station 5	497	76.3	15.0	61.3 (±9.3)	1.93 (1.67, 2.22)	-0.83 (.086)
Station 6	895	113.5	23.6	89.9 (±8.6)	2.24 (1.98, 2.53)	-0.83 (.064)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	2290	87.9	42.3	45.6 (±6.0)	1.36 (1.23, 1.50)	-0.61 (.040)
2.5 to 5 m/sec	3914	99.7	33.4	66.3 (±4.3)	2.30 (2.09, 2.53)	-0.57 (.031)
>5 m/sec	457	121.1	43.7	77.4 (±12.8)	3.63 (3.09, 4.25)	-0.42 (.090)
b. Stability Group						
Class A & B	617	100.0	107.7	-7.7 (±16.0)	0.77 (0.67, 0.88)	-0.22 (.077)
Class C	1333	102.8	86.0	16.8 (±9.3)	1.26 (1.13, 1.40)	-0.29 (.053)
Class D	3449	108.8	14.8	94.0 (±4.0)	15.40 (14.00, 16.94)	-0.70 (.033)
Class E & F	1262	57.6	12.2	45.4 (±3.9)	3.63 (3.25, 4.05)	-0.77 (.054)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 4141 AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4162	79.7 (±7.1)	0.83	21517 (20624, 22475)	27864	117.8	0.18 (0.15, 0.21)	-0.15 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6661	59.9 (±5.6)	0.80	20530 (19852, 21247)	24116	107.5	-0.03 (-0.05, -0.01)	-0.18 (.024)
3. All concentrations, by station (B-1)								
Station 1	1598	58.2 (±13.0)	0.74	20336 (19001, 21831)	23713	107.6	-0.13 (-0.18, -0.08)	0.14 (.048)
Station 2	1207	72.6 (±9.7)	0.88	23458 (21701, 25460)	28715	111.7	0.00 (-0.06, 0.06)	-0.24 (.055)
Station 3	1087	42.9 (±13.8)	0.82	23162 (21340, 25253)	24980	111.0	-0.06 (-0.12, -0.00)	-0.26 (.058)
Station 4	1377	44.2 (±12.9)	0.65	21672 (20146, 23396)	23611	106.8	-0.04 (-0.09, 0.01)	0.12 (.052)
Station 5	497	61.3 (±11.1)	0.92	9933 (8812, 11307)	13672	77.8	0.11 (0.02, 0.20)	-0.27 (.086)
Station 6	895	89.9 (±11.7)	1.00	16107 (14719, 17721)	24163	115.4	0.06 (-0.01, 0.13)	-0.21 (.064)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	2290	45.6 (±9.3)	0.79	22737 (21479, 24119)	24800	107.3	-0.05 (-0.09, -0.01)	-0.22 (.040)
2.5 to 5 m/sec	3914	66.2 (±7.3)	0.92	19050 (18235, 19926)	23433	106.4	-0.02 (-0.05, 0.01)	-0.16 (.031)
>5 m/sec	457	77.4 (±20.7)	0.75	20564 (18152, 23545)	26504	118.5	-0.06 (-0.15, 0.03)	0.10 (.090)
b. Stability Group								
Class A & B	617	-7.6 (±23.7)	0.57	43254 (38830, 48563)	43242	151.1	-0.05 (-0.13, 0.03)	-0.12 (.077)
Class C	1333	16.8 (±15.1)	0.62	32618 (30286, 35258)	32876	132.5	-0.08 (-0.13, -0.03)	-0.11 (.053)
Class D	3449	94.0 (±6.4)	0.88	14440 (13784, 15149)	23270	106.0	-0.02 (-0.05, 0.01)	0.16 (.033)
Class E & F	1262	45.4 (±7.0)	0.87	5773 (5349, 6254)	7826	64.2	-0.17 (-0.22, -0.12)	-0.25 (.054)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 4141 AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1487	104.9	38.1	66.8 (±5.8)	2.45 (2.19, 2.73)	-0.54 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2546	80.9	31.6	49.3 (±3.9)	2.39 (2.16, 2.64)	-0.51 (.038)
3. All concentrations, by station (B-1)						
Station 1	610	80.2	31.2	49.0 (±8.1)	4.20 (3.65, 4.83)	-0.39 (.078)
Station 2	465	85.6	25.2	60.4 (±9.6)	2.82 (2.41, 3.29)	-0.68 (.089)
Station 3	430	70.3	37.4	32.9 (±9.2)	0.82 (0.69, 0.97)	-0.60 (.093)
Station 4	518	83.9	46.8	37.1 (±9.2)	3.12 (2.71, 3.59)	-0.18 (.085)
Station 5	172	66.1	13.9	52.2 (±11.3)	2.13 (1.65, 2.76)	-0.82 (.147)
Station 6	351	91.9	19.8	72.1 (±9.4)	2.67 (2.19, 3.26)	-0.75 (.103)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	622	72.3	35.4	36.9 (±7.9)	1.78 (1.55, 2.05)	-0.50 (.077)
2.5 to 5 m/sec	1540	81.1	31.1	50.0 (±5.1)	2.36 (2.12, 2.63)	-0.53 (.049)
>5 m/sec	384	94.1	27.6	66.5 (±9.4)	4.82 (4.00, 5.82)	-0.52 (.098)
b. Stability Group						
Class A & B	228	82.5	79.5	3.0 (±16.6)	0.99 (0.79, 1.24)	-0.23 (.127)
Class C	509	81.5	62.1	19.4 (±10.1)	1.64 (1.42, 1.88)	-0.24 (.085)
Class D	1364	89.7	19.6	70.1 (±4.9)	7.16 (6.42, 8.00)	-0.62 (.052)
Class E & F	445	52.6	9.0	43.6 (±5.3)	5.18 (4.40, 6.11)	-0.74 (.091)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 4141 AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1487	66.8 (±6.9)	0.84	10049 (9367, 10816)	14510	89.0	0.24 (0.19, 0.29)	0.13 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2546	49.3 (±5.3)	0.78	10206 (9669, 10793)	12636	82.5	-0.01 (-0.05, 0.03)	-0.14 (.038)
3. All concentrations, by station (B-1)								
Station 1	610	49.0 (±12.2)	0.73	11532 (10346, 12956)	13917	85.1	-0.15 (-0.23, -0.07)	0.12 (.078)
Station 2	465	60.4 (±9.2)	0.85	10988 (9710, 12566)	14612	86.8	0.03 (-0.06, 0.12)	-0.19 (.089)
Station 3	430	32.9 (±14.1)	0.76	10250 (9014, 11788)	11306	80.7	-0.08 (-0.17, 0.01)	-0.20 (.093)
Station 4	518	37.0 (±12.3)	0.64	11240 (9774, 12926)	12589	80.5	0.02 (-0.07, 0.11)	0.10 (.085)
Station 5	172	52.3 (±10.3)	0.91	4311 (3534, 5411)	7018	62.9	0.26 (0.11, 0.39)	-0.22 (.147)
Station 6	351	72.1 (±10.9)	0.91	7059 (6127, 8246)	12243	86.8	0.15 (0.05, 0.25)	-0.18 (.103)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	622	37.0 (±10.0)	0.73	10570 (9493, 11862)	11920	81.3	-0.05 (-0.13, 0.03)	-0.16 (.077)
2.5 to 5 m/sec	1540	50.0 (±6.9)	0.78	10274 (9588, 11044)	12771	82.2	0.00 (-0.05, 0.05)	-0.15 (.049)
>5 m/sec	384	66.5 (±12.9)	0.82	8848 (7726, 10263)	13253	85.5	0.00 (-0.10, 0.10)	0.11 (.098)
b. Stability Group								
Class A & B	228	3.0 (±21.8)	0.55	16995 (14281, 20663)	16930	100.9	-0.04 (-0.17, 0.09)	-0.08 (.127)
Class C	509	19.4 (±13.7)	0.61	14204 (12618, 16143)	14552	91.9	-0.04 (-0.13, 0.05)	-0.10 (.085)
Class D	1364	70.1 (± 6.3)	0.85	8623 (8013, 9312)	13532	84.7	0.00 (-0.05, 0.05)	0.13 (.052)
Class E & F	445	43.6 (±7.2)	0.87	3602 (3174, 4132)	5499	55.4	-0.15 (-0.24, -0.06)	-0.22 (.091)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 4141 AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons		
				Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (Fraction)
1. Highest concentration, event-by-event (A-1)	355	46.0	16.8	29.2 ($\pm$4.1)	2.55 (2.09, 3.10)	-0.46 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1169	26.1	9.0	17.1 ($\pm$1.8)	2.87 (2.56, 3.21)	-0.57 (.056)
3. All concentrations, by station (B-1)						
Station 1	243	28.9	10.4	18.5 ($\pm$4.1)	3.60 (2.87, 4.50)	-0.46 (.123)
Station 2	234	26.2	6.6	19.6 ($\pm$3.6)	3.61 (2.88, 4.53)	-0.69 (.126)
Station 3	193	23.3	10.4	12.9 ($\pm$4.1)	1.13 (0.89, 1.43)	-0.60 (.138)
Station 4	213	29.7	15.6	14.1 ($\pm$5.2)	3.47 (2.76, 4.36)	-0.30 (.132)
Station 5	121	15.9	2.7	13.2 ($\pm$3.1)	4.23 (3.12, 5.75)	-0.88 (.175)
Station 6	165	27.8	5.2	22.6 ($\pm$3.9)	5.67 (4.37, 7.37)	-0.68 (.150)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: 4141 AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (Fraction)
1. Highest concentration, event-by-event (A-1)	355	29.2 (±3.5)	0.91	911 (791, 1063)	1760	32.3	0.46 (0.37, 0.54)	0.11 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1169	17.0 (±1.8)	0.84	696 (643, 756)	985	22.1	0.30 (0.25, 0.35)	0.14 (.056)
3. All concentrations, by station (B-1)								
Station 1	243	18.5 (±4.4)	0.82	915 (773, 1105)	1254	24.8	0.17 (0.05, 0.29)	0.15 (.123)
Station 2	234	19.6 (±3.5)	0.89	586 (493, 711)	968	22.6	0.32 (0.20, 0.43)	0.15 (.126)
Station 3	193	13.0 (±4.6)	0.80	748 (620, 926)	912	21.6	0.11 (-0.03, 0.25)	-0.17 (.138)
Station 4	213	14.1 (±4.7)	0.73	861 (719, 1054)	1055	21.6	0.51 (0.40, 0.60)	0.16 (.132)
Station 5	121	13.3 (±2.4)	0.96	179 (142, 236)	354	14.0	0.49 (0.34, 0.61)	-0.20 (.175)
Station 6	165	22.6 (±3.8)	0.92	566 (462, 714)	1073	24.6	0.15 (-0.00, 0.30)	0.13 (.150)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: TEM-8A AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3543	116.1	47.9	68.2 (±5.9)	0.96 (0.87, 1.05)	-0.71 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5759	90.0	44.1	45.9 (±4.1)	0.95 (0.86, 1.05)	-0.60 (.025)
3. All concentrations, by station (B-1)						
Station 1	1359	95.0	36.4	58.6 (±7.4)	1.45 (1.29, 1.61)	-0.59 (.052)
Station 2	880	96.5	53.4	43.1 (±11.0)	1.02 (0.90, 1.15)	-0.54 (.065)
Station 3	1089	87.8	48.2	39.6 (±11.2)	0.62 (0.55, 0.69)	-0.68 (.058)
Station 4	987	100.4	64.8	35.6 (±10.9)	0.84 (0.75, 0.94)	-0.43 (.061)
Station 5	715	58.0	14.2	43.8 (±5.7)	0.70 (0.61, 0.79)	-0.87 (.072)
Station 6	729	93.0	42.5	50.5 (±11.3)	1.63 (1.43, 1.86)	-0.58 (.071)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	2507	80.4	56.5	23.9 (±6.4)	0.74 (0.67, 0.82)	-0.54 (.038)
2.5 to 5 m/sec	2813	91.2	36.0	55.2 (±5.4)	1.07 (0.97, 1.18)	-0.67 (.036)
>5 m/sec	439	136.7	25.0	111.7 (±16.2)	1.86 (1.57, 2.20)	-0.66 (.092)
b. Stability Group						
Class A & B	802	72.8	124.6	-51.8 (±13.0)	0.58 (0.51, 0.66)	0.27 (.068)
Class C	1186	92.3	113.9	-21.6 (±12.6)	0.58 (0.52, 0.65)	-0.13 (.056)
Class D	2758	103.1	6.8	96.3 (±4.0)	13.85 (12.56, 15.27)	-0.88 (.037)
Class E & F	1013	65.0	0.3	64.7 (±5.2)	1804.50 (1611.16, 2021.04)	-1.00 (.060)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: TEM-8A AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3543	68.2 (±6.8)	0.85	27410 (26180, 28737)	32053	119.7	0.15 (0.12, 0.18)	-0.24 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5759	45.8 (±6.2)	0.80	24536 (23666, 25460)	26633	107.3	0.01 (-0.02, 0.04)	-0.23 (.025)
3. All concentrations, by station (B-1)								
Station 1	1359	58.6 (±12.9)	0.80	20845 (19368, 22515)	24262	108.4	-0.08 (-0.13, -0.03)	-0.19 (.052)
Station 2	880	43.1 (±15.8)	0.77	28030 (25596, 30865)	29853	115.5	-0.01 (-0.08, 0.06)	-0.21 (.065)
Station 3	1089	39.6 (±15.1)	0.81	31442 (28970, 34277)	32981	109.0	0.12 (0.06, 0.18)	-0.26 (.058)
Station 4	987	35.6 (±17.3)	0.71	32520 (29843, 35611)	33754	128.9	-0.06 (-0.12, 0.00)	-0.17 (.061)
Station 5	715	43.8 (±7.1)	0.93	5244 (4743, 5838)	7159	62.4	0.13 (0.06, 0.20)	-0.32 (.072)
Station 6	729	50.6 (±18.2)	0.79	24619 (22287, 27377)	27142	107.2	-0.02 (-0.09, 0.05)	-0.21 (.071)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	2507	23.8 (±9.8)	0.75	27947 (26467, 29567)	28504	109.2	-0.04 (-0.08, -0.00)	-0.24 (.038)
2.5 to 5 m/sec	2813	55.2 (±7.7)	0.83	19452 (18477, 20514)	22489	100.4	0.10 (0.06, 0.14)	-0.22 (.036)
>5 m/sec	439	111.7 (±24.4)	0.86	30087 (26494, 34548)	42501	139.9	0.00 (-0.09, 0.09)	-0.15 (.092)
b. Stability Group								
Class A & B	802	-51.8 (±17.9)	0.41	34209 (31108, 37847)	36845	133.0	0.02 (-0.05, 0.09)	0.10 (.068)
Class C	1186	-21.6 (±16.3)	0.52	46504 (42991, 50510)	46932	138.6	0.06 (0.00, 0.12)	0.12 (.056)
Class D	2758	96.3 (±5.8)	0.95	11261 (10691, 11882)	20533	101.9	0.03 (-0.01, 0.07)	-0.19 (.037)
Class E & F	1013	64.7 (±8.5)	1.00	7213 (6626, 7889)	11390	64.7	0.03 (-0.03, 0.09)	-0.31 (.060)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: TEM-8A AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1256	95.8	40.0	55.8 (±6.9)	1.10 (0.99, 1.23)	-0.66 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2205	74.1	37.4	36.7 (±4.6)	1.11 (1.00, 1.23)	-0.53 (.041)
3. All concentrations, by station (B-1)						
Station 1	521	79.9	31.0	48.9 (±8.6)	1.73 (1.51, 1.99)	-0.55 (.084)
Station 2	348	76.9	43.7	33.2 (±11.9)	1.17 (0.95, 1.42)	-0.42 (.103)
Station 3	425	71.5	40.0	31.5 (±12.3)	0.73 (0.61, 0.87)	-0.59 (.093)
Station 4	388	80.7	53.3	27.4 (±11.8)	1.03 (0.86, 1.25)	-0.35 (.098)
Station 5	241	50.2	13.9	36.3 (±6.9)	0.69 (0.55, 0.87)	-0.81 (.124)
Station 6	282	75.3	35.9	39.4 (±10.3)	1.00 (0.81, 1.25)	-0.52 (.115)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	656	67.1	46.4	20.7 (±8.4)	0.94 (0.82, 1.08)	-0.43 (.075)
2.5 to 5 m/sec	1290	72.3	36.8	35.5 (±5.9)	0.97 (0.87, 1.08)	-0.55 (.054)
>5 m/sec	259	101.0	17.7	83.3 (±13.2)	3.92 (3.14, 4.89)	-0.72 (.120)
b. Stability Group						
Class A & B	276	57.5	96.7	-39.2 (±14.9)	0.74 (0.59, 0.94)	0.30 (.110)
Class C	485	77.2	83.4	-6.2 (±12.7)	0.75 (0.65, 0.87)	-0.13 (.087)
Class D	1126	80.9	13.8	67.1 (±4.9)	4.62 (4.13, 5.16)	-0.76 (.057)
Class E & F	320	59.6	0.3	59.3 (±6.8)	1925.00 (1552.42, 2387.00)	-1.00 (.100)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: TEM-8A AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1256	55.8 (±8.5)	0.84	12439 (11524, 13478)	15546	90.1	0.21 (0.16, 0.26)	-0.19 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2205	36.7 (±6.1)	0.76	11427 (10783, 12136)	12768	81.2	0.05 (0.01, 0.09)	-0.18 (.041)
3. All concentrations, by station (B-1)								
Station 1	521	48.9 (±12.8)	0.78	10713 (9529, 12157)	13084	85.5	-0.06 (-0.15, 0.03)	-0.15 (.084)
Station 2	348	33.2 (±15.4)	0.74	12708 (11024, 14856)	13773	83.9	0.01 (-0.10, 0.12)	-0.18 (.103)
Station 3	425	31.4 (±14.5)	0.77	14257 (12529, 16410)	15212	81.3	0.15 (0.06, 0.24)	-0.22 (.093)
Station 4	388	27.4 (±16.3)	0.67	14290 (12486, 16561)	15003	93.0	-0.02 (-0.12, 0.08)	-0.12 (.098)
Station 5	241	36.3 (±8.2)	0.90	2337 (1973, 2825)	3647	50.3	0.22 (0.10, 0.34)	-0.28 (.124)
Station 6	282	39.5 (±18.2)	0.74	10459 (8937, 12453)	11979	79.9	0.04 (-0.08, 0.16)	-0.16 (.115)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	656	20.7 (±11.2)	0.69	12195 (10982, 13642)	12603	82.1	0.00 (-0.08, 0.08)	-0.18 (.075)
2.5 to 5 m/sec	1290	35.5 (±5.2)	0.77	10418 (9662, 11276)	11668	77.3	0.11 (0.06, 0.16)	-0.19 (.054)
>5 m/sec	259	83.4 (±17.0)	0.89	11760 (9984, 14116)	18663	98.3	-0.01 (-0.13, 0.11)	-0.16 (.120)
b. Stability Group								
Class A & B	274	-39.1 (±16.2)	0.34	14823 (12639, 17697)	16300	92.1	0.07 (-0.05, 0.19)	-0.10 (.116)
Class C	485	-6.1 (±13.4)	0.52	16852 (14928, 19215)	16855	91.1	0.18 (0.09, 0.26)	0.09 (.087)
Class D	1126	67.2 (± 6.6)	0.90	7184 (6628, 7820)	11690	80.5	-0.05 (-0.11, 0.01)	-0.17 (.057)
Class E & F	320	59.2 (±10.4)	1.00	3842 (3313, 4523)	7340	59.2	0.06 (-0.05, 0.17)	-0.28 (.108)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: TEM-8A AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons		
				Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	335	38.5	16.3	22.2 ($\pm$4.4)	2.06 (1.68, 2.53)	-0.50 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1132	22.3	9.3	13.0 ($\pm$1.7)	2.15 (1.92, 2.41)	-0.57 (.057)
3. All concentrations, by station (B-1)						
Station 1	216	28.3	9.8	18.5 ($\pm$4.7)	4.11 (3.27, 5.16)	-0.44 (.131)
Station 2	184	21.5	10.5	11.0 ($\pm$4.0)	1.81 (1.41, 2.32)	-0.54 (.142)
Station 3	198	23.9	10.9	13.0 ($\pm$4.8)	1.56 (1.23, 1.97)	-0.61 (.137)
Station 4	185	24.9	14.4	10.5 ($\pm$4.9)	1.84 (1.44, 2.36)	-0.44 (.141)
Station 5	208	13.6	2.0	11.6 ($\pm$1.7)	1.63 (1.30, 2.05)	-0.90 (.133)
Station 6	141	21.0	9.0	12.0 ($\pm$4.4)	2.48 (1.87, 3.29)	-0.51 (.162)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: TEM-8A AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability ($\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	335	22.2 (±4.8)	0.84	1181 (1022, 1385)	1670	29.3	0.31 (0.21, 0.40)	0.13 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1132	13.0 (±1.9)	0.81	689 (636, 750)	856	19.8	0.25 (0.19, 0.30)	0.15 (.057)
3. All concentrations, by station (B-1)								
Station 1	216	18.6 (±6.1)	0.77	1119 (936, 1368)	1459	25.5	0.09 (-0.04, 0.22)	0.14 (.131)
Station 2	184	11.0 (±4.4)	0.80	640 (528, 797)	758	18.8	0.18 (0.04, 0.32)	0.15 (.142)
Station 3	198	13.0 (±4.4)	0.82	791 (657, 977)	956	20.6	0.32 (0.19, 0.44)	0.17 (.137)
Station 4	185	10.6 (±5.1)	0.74	785 (648, 977)	893	20.9	0.35 (0.22, 0.47)	0.13 (.141)
Station 5	208	11.6 (±1.7)	0.96	104 (87, 128)	237	12.8	0.31 (0.18, 0.43)	-0.20 (.133)
Station 6	141	12.0 (±5.4)	0.76	649 (522, 836)	788	19.6	0.10 (-0.07, 0.26)	0.14 (.162)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: TEM-8A AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4075	129.2	40.3	88.9 (±5.0)	1.70 (1.55, 1.87)	-0.71 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6558	98.5	36.1	62.4 (±3.5)	1.73 (1.57, 1.90)	-0.62 (.024)
3. All concentrations, by station (B-1)						
Station 1	1494	101.3	30.1	71.2 (±7.1)	2.89 (2.59, 3.22)	-0.59 (.050)
Station 2	1230	100.5	30.5	70.0 (±8.3)	2.86 (2.55, 3.19)	-0.69 (.055)
Station 3	1110	85.9	42.8	43.1 (±8.2)	0.83 (0.74, 0.93)	-0.64 (.058)
Station 4	1273	106.7	49.7	57.0 (±8.6)	1.54 (1.37, 1.72)	-0.47 (.054)
Station 5	514	74.0	19.1	54.9 (±9.3)	1.68 (1.46, 1.94)	-0.77 (.085)
Station 6	937	108.6	35.8	72.8 (±9.2)	1.32 (1.17, 1.49)	-0.70 (.063)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	2407	83.9	54.1	29.8 (±6.4)	0.92 (0.83, 1.02)	-0.53 (.039)
2.5 to 5 m/sec	3733	104.2	25.9	78.3 (±4.2)	3.23 (2.94, 3.56)	-0.70 (.031)
>5 m/sec	418	131.7	22.9	108.8 (±13.2)	4.41 (3.70, 5.25)	-0.65 (.094)
b. Stability Group						
Class A & B	743	83.7	120.2	-36.5 (±13.7)	0.81 (0.71, 0.92)	0.20 (.071)
Class C	1426	96.5	86.5	10.0 (±9.0)	1.19 (1.07, 1.33)	-0.19 (.051)
Class D	3259	114.8	6.8	108.0 (±4.1)	19.95 (18.14, 21.94)	-0.87 (.034)
Class E & F	1130	63.7	1.4	62.3 (±3.9)	12.34 (11.03, 13.80)	-0.99 (.057)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: TEM-8A AVERAGING TIME: 1 hour

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Gross Variability ($\mu g/m^3)^2$	Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4075	89.0 (±7.8)	0.88	23932 (22928, 25009)	31843	126.6	0.11 (0.08, 0.14)	-0.20 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6558	62.4 (±5.8)	0.82	21968 (21236, 22742)	25863	111.1	-0.06 (-0.08, -0.04)	-0.20 (.024)
3. All concentrations, by station (B-1)								
Station 1	1494	71.2 (±13.5)	0.81	22308 (20797, 24007)	27363	114.7	-0.15 (-0.20, -0.10)	-0.17 (.050)
Station 2	1230	70.1 (±12.8)	0.85	21891 (20266, 23740)	26784	108.3	0.02 (-0.04, 0.08)	-0.22 (.055)
Station 3	1110	43.1 (±13.7)	0.80	20899 (19271, 22764)	22739	104.1	-0.07 (-0.13, -0.01)	-0.23 (.058)
Station 4	1273	57.0 (±16.0)	0.76	28206 (26145, 30545)	31438	126.2	-0.15 (-0.20, -0.10)	-0.16 (.054)
Station 5	514	54.9 (±11.6)	0.90	11309 (10052, 12845)	14305	81.1	0.02 (-0.07, 0.11)	-0.27 (.085)
Station 6	937	72.8 (±12.7)	0.85	19455 (17814, 21357)	24729	113.3	0.06 (-0.00, 0.12)	-0.21 (.063)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	2407	29.8 (±10.3)	0.74	27250 (25778, 28864)	28129	111.4	-0.07 (-0.11, -0.03)	-0.21 (.039)
2.5 to 5 m/sec	3733	78.3 (±7.0)	0.86	17630 (16859, 18461)	23750	108.9	-0.02 (-0.05, 0.01)	-0.19 (.031)
>5 m/sec	418	108.8 (±20.0)	0.88	19889 (17461, 22920)	31677	129.4	-0.06 (-0.16, 0.04)	-0.11 (.094)
b. Stability Group								
Class A & B	743	-36.5 (±21.5)	0.44	38180 (34595, 42413)	39463	143.7	-0.05 (-0.12, 0.02)	0.08 (.071)
Class C	1426	10.0 (±13.9)	0.57	31633 (29442, 34103)	31710	123.8	-0.06 (-0.11, -0.01)	0.10 (.051)
Class D	3259	108.0 (±6.3)	0.95	14596 (13914, 15334)	26259	114.2	-0.06 (-0.09, -0.03)	-0.18 (.034)
Class E & F	1130	62.3 (±5.9)	0.99	4524 (4174, 4924)	8399	64.6	-0.05 (-0.11, 0.01)	-0.28 (.057)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: TEM-8A AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1468	106.3	33.0	73.3 (±5.9)	2.11 (1.90, 2.36)	-0.66 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2534	81.3	30.5	50.8 (±4.0)	2.11 (1.91, 2.33)	-0.54 (.038)
3. All concentrations, by station (B-1)						
Station 1	569	85.6	25.6	60.0 (±8.6)	3.45 (3.00, 3.97)	-0.57 (.081)
Station 2	482	82.9	25.7	57.2 (±9.3)	3.09 (2.67, 3.58)	-0.62 (.088)
Station 3	434	69.8	36.0	33.8 (±9.1)	0.82 (0.70, 0.98)	-0.56 (.092)
Station 4	498	86.9	41.1	45.8 (±9.9)	2.19 (1.91, 2.53)	-0.37 (.086)
Station 5	185	61.9	17.1	44.8 (±10.6)	2.39 (1.87, 3.05)	-0.70 (.141)
Station 6	366	88.3	30.0	58.3 (±9.9)	1.80 (1.48, 2.18)	-0.62 (.101)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	667	67.9	47.7	20.2 (±8.5)	1.04 (0.91, 1.18)	-0.39 (.074)
2.5 to 5 m/sec	1504	82.9	26.9	56.0 (±5.0)	2.84 (2.54, 3.16)	-0.59 (.050)
>5 m/sec	363	99.2	13.7	85.5 (±9.3)	8.88 (7.30, 10.79)	-0.76 (.101)
b. Stability Group						
Class A & B	263	72.2	88.4	-16.2 (±15.5)	0.88 (0.71, 1.10)	0.17 (.119)
Class C	552	75.6	64.0	11.6 (±9.5)	1.74 (1.51, 2.00)	-0.16 (.082)
Class D	1319	92.5	13.8	78.7 (±5.0)	7.21 (6.45, 8.05)	-0.75 (.053)
Class E & F	400	58.0	1.1	56.9 (±5.2)	27.96 (23.29, 33.56)	-0.98 (.096)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: TEM-8A AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability ($\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1468	73.3 (±7.5)	0.87	11386 (10608, 12261)	16752	95.8	0.16 (0.11, 0.21)	-0.16 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2534	50.8 (±5.4)	0.79	10892 (10318, 11520)	13472	84.7	-0.04 (-0.08, -0.00)	-0.16 (.038)
3. All concentrations, by station (B-1)								
Station 1	569	60.0 (±12.3)	0.80	12559 (11226, 14171)	16137	93.3	-0.18 (-0.26, -0.10)	-0.15 (.081)
Station 2	482	57.2 (±10.8)	0.80	10142 (8981, 11569)	13395	82.0	0.08 (-0.01, 0.17)	-0.16 (.088)
Station 3	434	33.8 (±13.2)	0.75	10314 (9076, 11853)	11435	77.1	-0.09 (-0.18, 0.00)	-0.18 (.092)
Station 4	498	45.8 (±15.4)	0.73	14623 (12974, 16644)	16694	95.0	-0.16 (-0.24, -0.07)	-0.12 (.086)
Station 5	185	44.7 (±11.5)	0.86	4964 (4096, 6177)	6939	63.3	0.09 (-0.05, 0.23)	-0.23 (.141)
Station 6	366	58.3 (±11.4)	0.84	7390 (6432, 8604)	10763	80.8	0.22 (0.12, 0.32)	-0.16 (.101)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	667	20.2 (±10.9)	0.66	12837 (11570, 14347)	13226	82.8	-0.03 (-0.11, 0.05)	-0.15 (.074)
2.5 to 5 m/sec	1504	56.1 (±6.7)	0.82	9929 (9258, 10683)	13064	83.3	-0.01 (-0.06, 0.04)	-0.16 (.050)
>5 m/sec	363	85.5 (±12.4)	0.91	8323 (7240, 9697)	15611	94.2	-0.04 (-0.14, 0.06)	0.13 (.101)
b. Stability Group								
Class A & B	263	-16.2 (±18.3)	0.44	16627 (14133, 19928)	16827	96.7	-0.01 (-0.13, 0.11)	-0.06 (.119)
Class C	552	11.6 (±12.4)	0.55	12834 (11453, 14509)	12946	83.2	0.01 (-0.07, 0.09)	0.09 (.082)
Class D	1319	78.8 (±6.4)	0.90	9042 (8392, 9778)	15242	90.9	-0.08 (-0.13, -0.03)	-0.15 (.053)
Class E & F	400	56.9 (±6.4)	0.99	2927 (2563, 3384)	6154	58.6	-0.09 (-0.19, 0.01)	-0.26 (.096)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: TEM-8A AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons		
				Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	46.0	14.6	31.4 ($\pm$4.0)	3.06 (2.51, 3.73)	-0.51 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1171	26.0	8.5	17.5 ($\pm$1.7)	3.29 (2.94, 3.68)	-0.57 (.056)
3. All concentrations, by station (B-1)						
Station 1	238	29.4	8.1	21.3 ($\pm$4.1)	4.50 (3.59, 5.64)	-0.61 (.125)
Station 2	234	26.2	6.7	19.5 ($\pm$3.6)	3.86 (3.08, 4.83)	-0.68 (.126)
Station 3	192	23.4	9.7	13.7 ($\pm$3.8)	1.56 (1.23, 1.98)	-0.55 (.139)
Station 4	214	29.6	13.0	16.6 ($\pm$5.2)	3.79 (3.02, 4.77)	-0.37 (.131)
Station 5	125	15.5	3.4	12.1 ($\pm$3.0)	4.90 (3.62, 6.62)	-0.76 (.172)
Station 6	168	27.3	8.2	19.1 ($\pm$4.1)	2.78 (2.14, 3.60)	-0.57 (.148)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: TEM-8A AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons						
		Bias		Characteristic Discrepancies				
		Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Fraction of Positive Residuals ($C_o > C_p$)	Noise (Variance) ($\mu g/m^3$)^2	Gross Variability ($\mu g/m^3$)^2	Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	31.3 (±4.3)	0.89	1189 (1033, 1388)	2167	34.8	0.23 (0.13, 0.33)	0.14 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1171	17.6 (±1.9)	0.84	774 (715, 841)	1082	22.8	0.18 (0.12, 0.23)	0.14 (.056)
3. All concentrations, by station (B-1)								
Station 1	238	21.4 (±4.7)	0.86	946 (798, 1145)	1398	26.7	0.09 (-0.04, 0.21)	0.16 (.125)
Station 2	234	19.5 (±3.5)	0.87	568 (478, 689)	946	22.3	0.34 (0.22, 0.45)	0.16 (.126)
Station 3	192	13.8 (±4.4)	0.80	645 (534, 799)	831	20.2	0.12 (-0.02, 0.26)	-0.13 (.139)
Station 4	214	16.6 (±6.1)	0.75	1369 (1144, 1676)	1639	26.8	0.09 (-0.04, 0.22)	0.17 (.131)
Station 5	125	12.1 (±2.6)	0.92	218 (173, 286)	364	13.9	0.30 (0.13, 0.45)	-0.18 (.172)
Station 6	168	19.1 (±3.8)	0.88	571 (467, 719)	933	22.7	0.25 (0.10, 0.39)	0.13 (.148)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MULTIMAX AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3579	116.6	51.3	65.3 (±5.9)	0.96 (0.88, 1.06)	-0.69 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5437	95.1	37.0	58.1 (±4.1)	1.05 (0.95, 1.16)	-0.72 (.026)
3. All concentrations, by station (B-1)						
Station 1	1321	97.7	34.3	63.4 (±7.5)	1.42 (1.27, 1.59)	-0.66 (.053)
Station 2	810	104.6	51.0	53.6 (±12.6)	0.75 (0.66, 0.86)	-0.69 (.068)
Station 3	1010	94.2	35.3	58.9 (±10.6)	0.89 (0.79, 0.99)	-0.81 (.061)
Station 4	951	104.3	57.5	46.8 (±10.2)	1.21 (1.07, 1.36)	-0.45 (.062)
Station 5	692	59.7	8.6	51.1 (±6.2)	0.55 (0.48, 0.63)	-0.96 (.073)
Station 6	653	103.5	27.7	75.8 (±12.3)	1.53 (1.33, 1.75)	-0.84 (.075)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	2229	89.9	33.9	56.0 (±6.6)	0.90 (0.81, 1.00)	-0.78 (.041)
2.5 to 5 m/sec	2759	93.0	38.1	54.9 (±5.6)	0.99 (0.90, 1.09)	-0.69 (.037)
>5 m/sec	449	134.2	44.9	89.3 (±14.8)	3.04 (2.59, 3.58)	-0.54 (.091)
b. Stability Group						
Class A & B	551	104.4	117.3	-12.9 (±21.2)	0.32 (0.28, 0.36)	-0.52 (.082)
Class C	951	113.8	79.2	34.6 (±13.2)	0.88 (0.78, 0.99)	-0.52 (.062)
Class D	2828	100.8	15.9	84.9 (±4.1)	5.28 (4.79, 5.81)	-0.79 (.036)
Class E & F	1107	59.9	14.5	45.4 (±5.6)	3.25 (2.90, 3.63)	-0.81 (.058)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MULTIMAX AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $\lvert f(d) - f_n \rvert$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3527	65.3 (±8.3)	0.85	26797 (25592, 28097)	31054	119.0	0.17 (0.14, 0.20)	-0.23 (.032)
2. All concentrations, all stations (paired in time and location) (B-3)	5437	58.1 (±5.8)	0.86	23244 (22396, 24145)	26620	107.0	0.04 (0.01, 0.06)	-0.25 (.026)
3. All concentrations, by station (B-1)								
Station 1	1321	63.4 (±12.3)	0.83	21014 (19505, 22723)	25023	111.9	-0.08 (-0.13, -0.02)	-0.21 (.053)
Station 2	810	53.6 (±16.8)	0.85	31500 (28658, 34832)	34339	122.6	0.06 (-0.01, 0.12)	-0.27 (.068)
Station 3	1010	58.8 (±14.4)	0.90	28013 (25732, 30643)	31452	106.0	0.06 (-0.00, 0.12)	-0.30 (.061)
Station 4	951	46.8 (±13.7)	0.72	25681 (23530, 28172)	27848	117.0	0.00 (-0.06, 0.07)	-0.14 (.062)
Station 5	692	51.1 (±6.6)	0.98	6073 (5484, 6773)	8679	63.1	0.13 (0.06, 0.21)	-0.34 (.073)
Station 6	653	75.7 (±18.1)	0.91	24331 (21906, 27226)	30030	111.0	0.06 (-0.02, 0.13)	-0.27 (.075)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	2229	55.9 (±9.0)	0.88	24826 (23435, 26357)	27942	106.6	0.02 (-0.02, 0.07)	-0.29 (.041)
2.5 to 5 m/sec	2759	54.8 (±7.8)	0.85	21462 (20376, 22645)	24464	103.0	0.05 (0.01, 0.09)	-0.24 (.037)
>5 m/sec	449	89.3 (±23.1)	0.79	25393 (22391, 29111)	33309	132.0	0.01 (-0.08, 0.11)	-0.12 (.091)
b. Stability Group								
Class A & B	551	-12.9 (±27.1)	0.71	60816 (54265, 68762)	60872	160.5	0.07 (-0.01, 0.15)	-0.25 (.082)
Class C	951	34.6 (±17.7)	0.74	44288 (40579, 48583)	45427	144.0	-0.02 (-0.09, 0.04)	-0.20 (.062)
Class D	2828	84.8 (±6.0)	0.91	12141 (11534, 12802)	19342	99.4	0.05 (0.01, 0.09)	-0.19 (.036)
Class E & F	1107	45.4 (±9.6)	0.89	9944 (9168, 10833)	12000	69.1	-0.12 (-0.18, -0.06)	-0.13 (.058)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MULTIMAX AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1251	96.1	41.6	54.5 (±6.8)	1.25 (1.12, 1.40)	-0.63 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2066	79.8	31.1	47.7 (±4.6)	1.34 (1.21, 1.49)	-0.65 (.042)
3. All concentrations, by station (B-1)						
Station 1	506	82.3	28.7	53.6 (±8.5)	2.06 (1.80, 2.37)	-0.60 (.086)
Station 2	327	81.6	41.2	40.4 (±13.2)	0.88 (0.72, 1.08)	-0.60 (.106)
Station 3	385	78.3	29.6	48.7 (±11.6)	1.17 (0.97, 1.41)	-0.76 (.098)
Station 4	370	84.2	46.2	38.0 (±11.0)	1.60 (1.32, 1.94)	-0.36 (.100)
Station 5	231	52.2	8.5	43.7 (±7.2)	0.61 (0.49, 0.77)	-0.94 (.127)
Station 6	247	85.1	23.7	61.4 (±13.1)	1.87 (1.49, 2.33)	-0.81 (.122)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	572	76.0	25.3	50.7 (±8.6)	1.27 (1.10, 1.46)	-0.72 (.080)
2.5 to 5 m/sec	1232	75.5	33.4	42.1 (±5.9)	1.12 (1.00, 1.25)	-0.64 (.055)
>5 m/sec	262	100.2	33.0	67.2 (±13.2)	3.53 (2.83, 4.41)	-0.56 (.119)
b. Stability Group						
Class A & B	200	77.0	89.3	-12.3 (±21.6)	0.48 (0.38, 0.61)	-0.35 (.136)
Class C	394	93.5	53.8	39.7 (±13.1)	1.13 (0.94, 1.36)	-0.52 (.097)
Class D	1116	81.7	18.9	62.8 (±5.0)	3.43 (3.07, 3.84)	-0.72 (.058)
Class E & F	356	54.2	11.8	42.4 (±7.1)	3.75 (3.08, 4.57)	-0.76 (.102)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MULTIMAX AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1251	54.5 (±8.1)	0.83	11502 (10654, 12464)	14463	87.2	0.23 (0.18, 0.28)	-0.18 (.054)
2. All concentrations, all stations (paired in time and location) (B-3)	2066	47.6 (±5.6)	0.82	10284 (9686, 10944)	12548	80.8	0.08 (0.04, 0.12)	-0.20 (.042)
3. All concentrations, by station (B-1)								
Station 1	506	53.6 (±12.3)	0.80	10403 (9238, 11827)	13252	86.6	-0.10 (-0.19, -0.02)	-0.16 (.086)
Station 2	327	40.4 (±14.7)	0.81	13306 (11493, 15636)	14897	86.4	0.11 (0.00, 0.22)	-0.22 (.106)
Station 3	385	48.7 (±13.9)	0.87	12263 (10709, 14220)	14604	81.8	0.10 (-0.00, 0.20)	-0.27 (.098)
Station 4	370	38.1 (±12.6)	0.68	10390 (9050, 12086)	11811	82.2	0.12 (0.02, 0.22)	0.07 (.100)
Station 5	231	43.6 (±7.9)	0.98	2568 (2160, 3118)	4462	52.6	0.18 (0.05, 0.30)	-0.31 (.127)
Station 6	247	61.5 (±18.1)	0.89	9721 (8222, 11723)	13457	84.5	0.12 (-0.00, 0.24)	-0.22 (.122)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	572	50.7 (±10.3)	0.86	10332 (9237, 11654)	12888	82.2	0.06 (-0.03, 0.14)	-0.23 (.080)
2.5 to 5 m/sec	1232	42.0 (±7.6)	0.81	10141 (9388, 10997)	11899	78.5	0.08 (0.02, 0.14)	-0.21 (.055)
>5 m/sec	262	67.2 (±14.0)	0.82	10379 (8819, 12445)	14854	38.9	0.15 (0.03, 0.27)	0.13 (.119)
b. Stability Group								
Class A & B	200	-12.3 (±23.0)	0.63	20920 (17384, 25799)	20966	102.4	0.14 (0.00, 0.27)	-0.16 (.136)
Class C	394	39.7 (±15.8)	0.74	16966 (14839, 19639)	18498	98.7	0.04 (-0.06, 0.14)	-0.15 (.097)
Class D	1116	62.8 (± 6.1)	0.88	6772 (6246, 7374)	10713	77.8	0.09 (0.04, 0.15)	-0.17 (.058)
Class E & F	356	42.5 (±11.1)	0.87	5198 (4516, 6065)	6985	58.3	-0.13 (-0.23, -0.02)	-0.24 (.102)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MULTIMAX AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $\max\|f(C_o) - f(C_p)\|$ (fraction)
1. Highest concentration, event-by-event (A-1)	334	38.6	15.9	22.7 ($\pm$4.3)	2.19 (1.79, 2.69)	-0.52 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1101	22.8	7.6	15.2 ($\pm$1.7)	2.58 (2.31, 2.89)	-0.68 (.058)
3. All concentrations, by station (B-1)						
Station 1	210	29.1	8.9	20.2 ($\pm$4.6)	5.53 (4.40, 6.96)	-0.49 (.133)
Station 2	179	22.1	9.3	12.8 ($\pm$4.2)	1.53 (1.19, 1.97)	-0.64 (.144)
Station 3	193	24.5	8.0	16.5 ($\pm$4.5)	2.25 (1.77, 2.86)	-0.78 (.138)
Station 4	180	25.5	12.5	13.0 ($\pm$4.8)	2.38 (1.85, 3.06)	-0.47 (.143)
Station 5	206	13.7	1.2	12.5 ($\pm$1.6)	1.94 (1.54, 2.44)	-0.96 (.134)
Station 6	133	22.2	5.6	16.6 ($\pm$4.5)	2.62 (1.96, 3.51)	-0.77 (.167)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MULTIMAX AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference $(C_o - C_p)$ $(\mu g/m^3)$	Bias: Fraction of Positive Residuals $(C_o > C_p)$	Characteristic Discrepancies: Noise (Variance) $(\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability $(\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference $(\mu g/m^3)$	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	334	22.7 (±4.2)	0.84	1059 (916, 1242)	1570	28.5	0.38 (0.28, 0.47)	0.12 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1101	15.3 (±1.8)	0.86	627 (578, 683)	859	19.7	0.30 (0.25, 0.35)	0.16 (.058)
3. All concentrations, by station (B-1)								
Station 1	210	20.2 (±6.0)	0.80	1048 (875, 1285)	1453	25.7	0.13 (-0.01, 0.26)	0.14 (.133)
Station 2	179	12.7 (±3.7)	0.84	549 (452, 686)	708	18.9	0.35 (0.21, 0.47)	-0.19 (.144)
Station 3	193	16.5 (±4.8)	0.88	779 (645, 965)	1047	20.9	0.26 (0.12, 0.39)	-0.19 (.138)
Station 4	180	13.0 (±4.0)	0.78	611 (503, 763)	777	18.7	0.48 (0.36, 0.59)	0.18 (.143)
Station 5	206	12.5 (±1.7)	0.98	95 (79, 117)	250	13.1	0.34 (0.21, 0.46)	-0.20 (.134)
Station 6	133	16.5 (±5.0)	0.88	639 (511, 830)	908	21.1	0.11 (-0.06, 0.28)	-0.16 (.167)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MULTIMAX AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4069	129.5	53.3	76.2 (±5.6)	1.02 (0.93, 1.12)	-0.67 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6355	101.6	38.3	63.3 (±3.9)	1.12 (1.02, 1.23)	-0.69 (.024)
3. All concentrations, by station (B-1)						
Station 1	1481	102.2	37.9	64.3 (±7.6)	1.88 (1.69, 2.10)	-0.62 (.050)
Station 2	1180	104.6	29.6	75.0 (±9.4)	1.58 (1.41, 1.76)	-0.78 (.056)
Station 3	1060	89.9	48.0	41.9 (±10.5)	0.41 (0.37, 0.460	-0.72 (.059)
Station 4	1275	106.7	59.0	47.7 (±9.0)	1.24 (1.11, 1.38)	-0.43 (.054)
Station 5	483	78.5	12.3	66.2 (±10.6)	1.07 (0.92, 1.24)	-0.93 (.088)
Station 6	876	115.9	22.9	93.0 (±9.7)	1.21 (1.07, 1.37)	-0.89 (.065)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	2155	93.2	40.9	52.3 (±7.2)	0.79 (0.71, 0.88)	-0.74 (.041)
2.5 to 5 m/sec	3753	103.8	34.7	69.1 (±3.2)	1.38 (1.26, 1.52)	-0.69 (.031)
>5 m/sec	447	124.0	55.8	68.2 (±14.8)	1.53 (1.30, 1.80)	-0.47 (.091)
b. Stability Group						
Class A & B	537	114.6	122.9	-8.3 (±23.0)	0.35 (0.30, 0.40)	-0.46 (.083)
Class C	1204	113.3	83.1	30.2 (±11.4)	0.76 (0.68, 0.85)	-0.49 (.055)
Class D	3390	110.7	18.1	92.6 (±4.2)	6.13 (5.58, 6.75)	-0.75 (.033)
Class E & F	1224	59.2	13.0	46.2 (±4.4)	1.92 (1.71, 2.14)	-0.83 (.055)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MULTIMAX AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference $(C_o - C_p)$ $(\mu g/m^3)$	Bias: Fraction of Positive Residuals $(C_o > C_p)$	Characteristic Discrepancies: Noise (Variance) $(\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability $(\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference $(\mu g/m^3)$	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4069	76.2 (±7.4)	0.84	27707 (26544, 28955)	33505	127.0	0.17 (0.14, 0.20)	-0.19 (.030)
2. All concentrations, all stations (paired in time and location) (B-3)	6355	63.3 (±5.9)	0.84	25980 (25102, 26910)	29984	116.0	-0.03 (-0.06, -0.01)	-0.23 (.024)
3. All concentrations, by station (B-1)								
Station 1	1481	64.2 (±14.0)	0.81	25141 (23431, 27065)	29254	119.0	-0.12 (-0.17, -0.07)	-0.20 (.050)
Station 2	1180	74.9 (±13.1)	0.89	27022 (24976, 29356)	32622	114.0	0.01 (-0.05, 0.07)	-0.26 (.056)
Station 3	1060	41.8 (±14.7)	0.85	30598 (28162, 33397)	32323	113.0	0.00 (-0.06, 0.06)	-0.28 (.059)
Station 4	1275	47.7 (±14.8)	0.71	29822 (27645, 32293)	32076	125.0	-0.11 (-0.17, -0.06)	-0.13 (.054)
Station 5	483	66.3 (±11.8)	0.96	12614 (11171, 14387)	16981	81.6	0.12 (0.03, 0.20)	-0.31 (.088)
Station 6	876	92.9 (±12.0)	0.94	20340 (18570, 22402)	28961	121.8	0.06 (-0.01, 0.12)	-0.25 (.065)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	2155	52.3 (±10.0)	0.85	30340 (28612, 32244)	33058	116.0	-0.04 (-0.09, -0.00)	-0.28 (.041)
2.5 to 5 m/sec	3753	69.0 (±7.7)	0.84	23370 (22350, 24468)	28135	115.0	-0.03 (-0.06, 0.00)	-0.21 (.031)
>5 m/sec	447	68.1 (±22.1)	0.74	26099 (23008, 29930)	30691	125.0	-0.03 (-0.12, 0.06)	-0.10 (.091)
b. Stability Group								
Class A & B	537	-8.3 (±31.1)	0.69	78086 (67901, 89799)	78009	186.0	-0.07 (-0.15, 0.02)	-0.22 (.083)
Class C	1204	30.2 (±16.8)	0.72	44159 (40847, 47932)	45035	150.0	-0.09 (-0.15, -0.04)	-0.19 (.055)
Class D	3390	92.6 (±6.6)	0.89	15922 (15192, 16711)	24494	110.0	-0.03 (-0.06, 0.01)	-0.16 (.033)
Class E & F	1224	46.1 (±8.0)	0.90	7191 (6656, 7800)	9315	68.7	-0.19 (-0.24, -0.13)	-0.30 (.055)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MULTIMAX AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1457	106.9	43.0	63.9 (±6.4)	1.41 (1.26, 1.57)	-0.61 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2449	83.9	32.3	51.6 (±4.3)	1.53 (1.39, 1.70)	-0.60 (.039)
3. All concentrations, by station (B-1)						
Station 1	584	83.4	31.6	51.8 (±8.8)	2.51 (2.18, 2.88)	-0.53 (.080)
Station 2	450	88.4	25.2	63.2 (±10.3)	2.05 (1.75, 2.42)	-0.74 (.091)
Station 3	406	74.2	41.0	33.2 (±11.0)	0.50 (0.42, 0.60)	-0.67 (.095)
Station 4	499	86.7	48.5	38.2 (±10.0)	2.09 (1.82, 2.41)	-0.30 (.086)
Station 5	169	67.1	11.3	55.8 (±12.4)	1.37 (1.06, 1.77)	-0.90 (.148)
Station 6	341	94.5	19.4	75.1 (±10.5)	1.49 (1.22, 1.83)	-0.84 (.104)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
< 2.5 m/sec	581	77.1	33.3	43.8 (±8.9)	1.20 (1.04, 1.38)	-0.63 (.080)
2.5 to 5 m/sec	1487	83.8	31.8	52.0 (±5.6)	1.50 (1.34, 1.67)	-0.61 (.050)
>5 m/sec	381	94.8	32.9	61.9 (±10.0)	2.82 (2.33, 3.40)	-0.55 (.099)
b. Stability Group						
Class A & B	208	90.1	86.8	3.3 (±21.5)	0.49 (0.39, 0.62)	-0.38 (.133)
Class C	467	88.4	59.0	29.4 (±11.7)	1.09 (0.93, 1.27)	-0.40 (.089)
Class D	1335	91.4	21.8	69.6 (±5.2)	4.03 (3.61, 4.50)	-0.67 (.053)
Class E & F	439	53.4	10.2	43.2 (±5.7)	2.71 (2.29, 3.20)	-0.80 (.092)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MULTIMAX AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability ($\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1457	64.0 (±7.3)	0.83	11719 (10916, 12624)	15807	92.6	0.25 (0.20, 0.30)	-0.15 (.050)
2. All concentrations, all stations (paired in time and location) (B-3)	2449	51.5 (±5.7)	0.81	12077 (11430, 12786)	14732	88.1	-0.02 (-0.06, 0.02)	-0.18 (.039)
3. All concentrations, by station (B-1)								
Station 1	584	51.8 (±13.3)	0.76	13534 (12114, 15246)	16199	92.7	-0.16 (-0.24, -0.08)	-0.14 (.080)
Station 2	450	63.2 (±11.5)	0.89	11735 (10349, 13451)	15707	88.7	0.06 (-0.04, 0.15)	-0.22 (.091)
Station 3	406	33.2 (±15.3)	0.81	12976 (11371, 14986)	14045	85.0	-0.02 (-0.12, 0.08)	-0.24 (.095)
Station 4	499	38.2 (±13.7)	0.66	14080 (12493, 16024)	15509	89.7	-0.09 (-0.18, -0.01)	0.11 (.086)
Station 5	169	55.8 (±9.8)	0.95	4795 (3924, 6032)	7876	65.3	0.29 (0.14, 0.42)	-0.27 (.148)
Station 6	341	75.1 (±11.1)	0.93	8389 (7267, 9824)	14010	91.9	0.14 (0.04, 0.25)	-0.21 (.104)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
< 2.5 m/sec	581	43.8 (±10.8)	0.81	12711 (11375, 14324)	14610	88.7	-0.05 (-0.13, 0.03)	-0.22 (.080)
2.5 to 5 m/sec	1487	51.9 (±7.5)	0.81	12265 (11432, 13201)	14956	88.1	-0.01 (-0.06, 0.04)	-0.19 (.050)
>5 m/sec	381	61.9 (±13.6)	0.80	10238 (8935, 11882)	14040	87.2	-0.03 (-0.13, 0.07)	0.11 (.099)
b. Stability Group								
Class A & B	208	3.3 (±26.7)	0.63	25854 (21558, 31745)	25746	120.0	-0.04 (-0.17, 0.10)	-0.17 (.133)
Class C	467	29.4 (±15.7)	0.68	17490 (15459, 19995)	18316	101.0	-0.06 (-0.15, 0.04)	-0.15 (.089)
Class D	1335	69.6 (± 6.7)	0.85	9708 (9014, 10493)	14549	88.0	-0.03 (-0.09, 0.02)	-0.14 (.053)
Class E & F	439	43.1 (±8.0)	0.88	4405 (3879, 5058)	6257	58.9	-0.21 (-0.29, -0.11)	-0.26 (.092)

TABLE B. (PART I) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MULTIMAX AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons		
				Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	46.0	18.0	28.0 ($\pm$4.4)	1.71 (1.40, 2.08)	-0.50 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1149	26.5	8.9	17.6 ($\pm$1.8)	2.23 (2.00, 2.50)	-0.63 (.057)
3. All concentrations, by station (B-1)						
Station 1	240	29.2	9.9	19.3 ($\pm$4.3)	2.81 (2.24, 3.52)	-0.55 (.124)
Station 2	228	26.8	6.4	20.4 ($\pm$3.8)	2.98 (2.37, 3.73)	-0.74 (.127)
Station 3	187	24.0	11.4	12.6 ($\pm$4.6)	0.75 (0.59, 0.95)	-0.63 (.141)
Station 4	212	29.8	15.3	14.5 ($\pm$5.3)	3.01 (2.39, 3.78)	-0.36 (.132)
Station 5	120	16.1	2.0	14.1 ($\pm$3.2)	3.23 (2.38, 4.40)	-0.92 (.176)
Station 6	162	28.3	4.8	23.5 ($\pm$4.0)	4.21 (3.24, 5.48)	-0.77 (.151)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MULTIMAX AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - r_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	355	27.9 (±3.7)	0.89	1033 (897, 1206)	1811	32.7	0.43 (0.34, 0.51)	0.12 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1149	17.6 (±1.9)	0.86	770 (711, 837)	1079	23.1	0.26 (0.20, 0.31)	-0.16 (.057)
3. All concentrations, by station (B-1)								
Station 1	240	19.3 (±4.9)	0.84	1016 (857, 1229)	1386	25.9	0.11 (-0.01, 0.24)	0.15 (.124)
Station 2	228	20.4 (±3.5)	0.93	601 (505, 731)	1016	23.5	0.32 (0.20, 0.43)	-0.17 (.127)
Station 3	187	12.6 (±4.8)	0.80	863 (713, 1072)	1016	22.4	0.17 (0.03, 0.31)	-0.19 (.141)
Station 4	212	14.5 (±4.9)	0.76	1016 (849, 1245)	1223	23.2	0.40 (0.28, 0.51)	0.16 (.132)
Station 5	120	14.0 (±2.3)	0.98	166 (131, 219)	361	14.0	0.55 (0.41, 0.66)	-0.20 (.176)
Station 6	162	23.4 (±3.8)	0.93	584 (476, 739)	1131	25.4	0.15 (-0.00, 0.30)	-0.13 (.151)

APPENDIX C

Statistics for Highest Concentration at Each Station

Appendix C: Statistics for Highest Concentration at Each Station

In the tables which follow, model performance statistics are presented which compare the maximum observed and predicted concentration value during a year at each monitoring station (a total of six observed and six predicted values.) Each table contains results for one calendar year and one averaging time. Results for all eight models are given in each table. The performance measures are analogous to those in Table B (Part 2.)

Statistical analyses in these tables compare the six pairs of observed-predicted values. The first two columns present the averages of the six maximum observed and predicted concentration values. The third column presents the average difference between observed and predicted values, with the 95 percent confidence interval in parentheses (calculated with a one-sample t test, based on six data points.) The fourth column indicates the fraction of observed-predicted data pairs for which the observed value is greater than the predicted. The variance of the residuals (differences) is presented in the fifth column, with 95 percent confidence bounds as given by an F test. The gross variability (average squared residual) is listed next, followed by the average absolute residual. The Pearson correlation coefficient indicates the spatial correlation of the maximum concentration values at each station. The 95 percent confidence bounds for the correlation coefficient were calculated using a Fisher z test. The frequency distribution normality test is described in Section B. The frequency distribution of the residuals is compared with a normal frequency distribution. The maximum fractional difference between these distributions is presented. In parentheses, the maximum difference which is significantly different from zero at a 95 percent confidence level is presented, as given by the K-S test.

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2)
CLIFTY CREEK (1975) AVERAGING TIME: 1 HOUR

MODEL	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Performance Measures: Bias: Fraction of Positive Residuals ($C_o > C_p$)	Performance Measures: Characteristic Discrepancies: Noise ($\mu g/m^3$)[1]	Performance Measures: Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)[1]	Performance Measures: Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient
MPTER (CRSTER, PLUMES)	994.5	1207.9	-213.4 (±571.4)	0.33	296578 (115580, 1784465)	292701	419.8	-0.09 (-0.84, 0.78)
MPSDM	994.5	1592.0	-597.5 (±1059.1)	0.17	1019002 (397117, 6131179)	1206216	744.8	-0.23 (-0.88, 0.72)
COMPTER	994.5	1228.0	-233.5 (±657.2)	0.33	305727 (119145, 183951)	309301	422.6	-0.07 (-0.83, 0.79)
SCSTER	994.5	1027.3	-32.8 (±427.3)	0.50	165889 (64649, 998129)	139317	305.4	0.39 (-0.62, 0.91)
3141	994.5	591.3	403.2 (±450.5)	0.83	184374 (71853, 1109350)	316170	467.3	0.21 (-0.73, 0.87)
4141	994.5	591.3	403.2 (±450.5)	0.83	184374 (71853, 1109350)	316170	467.3	0.21 (-0.73, 0.87)
TEM 8A	994.5	1043.0	-48.5 (±279.1)	0.17	70750 (27572, 425692)	61313	197.6	0.80 (-0.03, 0.98)
MULTIMAX	994.5	1020.3	-25.8 (±402.6)	0.67	147277 (57396, 886143)	123396	291.2	0.49 (-0.53, 0.93)

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2)
CLIFTY CREEK (1975) AVERAGING TIME: 3 HOURS

MODEL	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias — Average Difference ($C_O - C_p$) ($\mu g/m^3$)	Performance Measures: Bias — Fraction of Positive Residuals ($C_O > C_p$)	Performance Measures: Characteristic Discrepancies — Noise ($\mu g/m^3$)[1]	Performance Measures: Characteristic Discrepancies — Gross Variability ($\mu g/m^3$)[1]	Performance Measures: Characteristic Discrepancies — Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient
MPTER (CRSTER, PLUMES)	543.3	540.3	3.0 (±222.7)	0.50	45422 (17702, 273298)	37861	172.3	0.20 (-0.73, 0.87)
MPSDM	543.3	693.3	-150.0 (±616.2)	0.67	344940 (134427, 2075451)	309945	324.1	-0.56 (-0.94, 0.46)
COMPTER	543.3	602.3	-59.0 (±192.8)	0.33	33774 (13162, 203213)	31630	147.3	0.40 (-0.61, 0.91)
SCSTER	543.3	476.3	-67.0 (±206.0)	0.67	38548 (15023, 231937)	36615	173.3	0.28 (-0.69, 0.89)
3141	543.3	314.7	228.6 (±184.6)	0.83	30951 (12062, 186227)	78052	236.2	0.28 (-0.69, 0.89)
4141	543.3	314.7	228.6 (±184.6)	0.83	30951 (12062, 186227)	78052	236.2	0.28 (-0.69, 0.89)
TEM 8A	543.3	508.3	35.0 (±155.0)	0.50	21827 (8506, 131330)	19410	111.9	0.78 (-0.09, 0.97)
MULTIMA	543.3	465.5	77.8 (±195.7)	0.67	34782 (13555, 209278)	35041	172.2	0.35 (-0.64, 0.90)

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2)
CLIFTY CREEK (1975) AVERAGING TIME: 24 HOURS

MODEL	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Performance Measures: Bias: Fraction of Positive Residuals ($C_o > C_p$)	Performance Measures: Characteristic Discrepancies: Noise ($\mu g/m^3$)[2]	Performance Measures: Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)[2]	Performance Measures: Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient
MPTER (CRSTER, PLUMES)	151.8	135.5	16.3 (±35.8)	0.67	1169 (456, 7033)	1240	32.1	0.75 (-0.16, 0.97)
MPSDM	151.8	130.1	21.7 (±84.6)	0.83	6500 (2533, 39110)	5890	66.3	-0.26 (-0.88, 0.70)
COMPTER	151.8	171.2	-19.4 (±54.2)	0.33	2673 (1042, 16083)	2604	43.5	0.58 (-0.44, 0.95)
SCSTER	151.8	83.1	68.7 (±40.8)	1.00	1510 (588, 9085)	5983	68.7	0.79 (-0.06, 0.98)
3141	151.8	74.6	77.2 (±35.9)	1.00	1171 (456, 7046)	6947	77.3	0.91 (0.38, 0.99)
4141	151.8	74.6	77.2 (±35.9)	1.00	1170 (456, 7040)	6888	76.9	0.92 (0.43, 0.99)
TEM 8A	151.8	92.4	59.4 (±38.6)	0.83	1356 (528, 8159)	4665	61.3	0.72 (-0.22, 0.97)
MULTIMAX	151.8	85.7	66.1 (±39.7)	1.00	1434 (559, 8628)	5563	66.1	0.88 (0.24, 0.99)

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2)
CLIFTY CREEK (1976) AVERAGING TIME: 1 HOUR

			Performance Measures					
			Bias		Characteristic Discrepancies			
MODEL	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Average Difference ($C_O - C_p$) ($\mu g/m^3$)	Fraction of Positive Residuals ($C_O > C_p$)	Noise ($\mu g/m^3$)[a]	Gross Variability ($\mu g/m^3$)[a]	Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient
MPTER (CRSTER, PLUMES)	858.1	1118.1	-260.0 (±143.0)	0.00	18570 (7237, 111733)	83076	260.0	0.79 (-0.06, 0.98)
MPSDM	858.1	1152.9	-294.8 (±268.7)	0.17	65600 (25565, 394705)	141621	308.1	0.21 (-0.73, 0.87)
COMPTER	858.1	1160.3	-302.2 (±200.4)	0.00	36501 (14225, 219621)	121769	302.2	0.62 (-0.39, 0.95)
SCSTER	858.1	1023.3	-165.2 (±240.4)	0.17	52515 (20466, 315975)	71076	239.8	0.51 (-0.51, 0.93)
3141	858.1	626.2	231.9 (±166.1)	1.00	25051 (9763, 150728)	74608	231.8	0.42 (-0.59, 0.92)
4141	858.1	626.2	231.9 (±166.1)	1.00	25051 (9763, 150728)	74608	231.8	0.42 (-0.59, 0.92)
TEM 8A	858.1	953.0	-94.9 (±293.6)	0.50	78332 (30527, 471312)	74296	230.7	-0.49 (-0.93, 0.53)
MULTIMAX	858.1	1025.9	-167.8 (±236.6)	0.17	50843 (19814, 305915)	70545	242.8	0.50 (-0.52, 0.93)

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2) CLIFTY CREEK (1976) AVERAGING TIME: 3 HOURS

MODEL	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Performance Measures: Bias: Fraction of Positive Residuals ($C_o > C_p$)	Performance Measures: Characteristic Discrepancies: Noise ($\mu g/m^3$)[a]	Performance Measures: Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)[a]	Performance Measures: Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient
MPTER (CRSTER, PLUMES)	525.6	579.5	-53.9 (±163.2)	0.50	24196 (9429, 145583)	23060	119.1	0.26 (-0.70, 0.88)
MPSDM	525.6	562.0	-36.4 (±220.1)	0.50	44018 (17154, 264850)	38001	149.8	0.31 (-0.67, 0.90)
COMPTER	525.6	666.4	-140.8 (±195.3)	0.33	34642 (13500, 208436)	48671	153.9	0.31 (-0.67, 0.90)
SCSTER	525.6	488.2	37.4 (±142.6)	0.50	18482 (7203, 111203)	16801	119.4	0.10 (-0.77, 0.84)
3141	525.6	324.1	201.5 (±131.3)	1.00	15665 (6105, 94254)	53656	201.5	0.03 (-0.80, 0.82)
4141	525.6	324.1	201.5 (±131.3)	1.00	15665 (6105, 94254)	[illegible]	201.5	0.03 (-0.80, 0.82)
TEM 8A	525.6	443.0	82.6 (±185.0)	0.67	31080 (12112, 187004)	32736	158.7	0.29 (-0.68, 0.89)
MULTIMAX	525.6	463.2	62.4 (±160.8)	0.50	23500 (9158, 141396)	23476	129.5	-0.10 (-0.84, 0.77)

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2)
CLIFTY CREEK (1976) AVERAGING TIME: 24 HOURS

MODEL	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Performance Measures: Bias: Fraction of Positive Residuals ($C_o > C_p$)	Performance Measures: Characteristic Discrepancies: Noise ($\mu g/m^3$)[1]	Performance Measures: Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)[1]	Performance Measures: Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient
MPTER (CRSTER, PLUME5)	132.8	133.3	-0.5 (±63.7)	0.67	3682 (1435, 22154)	3068	39.3	0.41 (-0.60, 0.92)
MPSDM	132.8	107.1	25.7 (±45.8)	0.67	1906 (743, 11468)	2248	44.3	0.25 (-0.70, 0.88)
COMPTER	132.8	159.6	-26.8 (±67.6)	0.17	4146 (1616, 24946)	4173	45.0	0.49 (-0.53, 0.93)
SCSTER	132.8	100.1	32.7 (±57.7)	0.83	3021 (1177, 18177)	3590	56.4	0.25 (-0.70, 0.88)
3141	132.8	74.3	58.5 (±37.1)	1.00	1250 (487, 7521)	4459	58.5	0.34 (-0.65, 0.90)
4141	132.8	75.5	57.3 (±36.1)	1.00	1181 (460, 7106)	4271	57.3	0.38 (-0.62, 0.91)
TEM 8A	132.8	74.8	58.0 (±22.6)	1.00	466 (182, 2804)	3750	58.0	0.74 (-0.18, 0.97)
MULTIMAX	132.8	99.2	33.6 (±55.5)	0.83	2796 (1090, 16823)	3456	54.6	0.25 (-0.70, 0.88)

APPENDIX D

Comparisons of Highest Values for Various Pairings

Appendix D: Comparisons of Highest Values for Various Pairings

The tables which follow present single-value residuals representing the difference between the highest observed (or predicted) value over all events and locations and the corresponding predicted (observed) value for the same event or location. Results for all eight models are given in one table. Each table contains results for one calendar year and one averaging time. The tables contain no statistical measures, since confidence intervals cannot be assigned for single-value comparisons.

The first two columns present the highest observed and highest predicted concentration values for the year, over all events and locations. In parentheses following each value, the Julian day and time period are indicated. The difference between the highest observed and highest predicted values is given in the third column. A positive difference indicates model underprediction.

The fourth column presents the difference between the highest observed value and the value predicted at the same location and for the same event (paired in space and time). The fifth column presents the difference between the highest observed value and the highest value predicted at any station for the event when the highest observed value occurred (paired in time, not space). The sixth column presents the difference between the highest observed value and the highest value for the year predicted at the station where the highest observed value occurred (paired in space, not time).

The final three columns present the analogous single-value residuals obtained using the highest predicted value. Again, results are presented representing, in turn, pairing in space and time, pairing in time not space, and pairing in space not time.

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1975) AVERAGING TIME: 1 HOUR

	SO_2 Concentration ($\mu g/m^3$)								
				Difference between $C_o$max and -			Difference between C_o and $C_p$max, where C_o is-		
MODEL	Highest Observed value over all events and all locations $C_o$max (Day, Hour)	Highest Predicted value over all events and locations $C_p$max (Day, Hour)	Difference of Maximum Values $C_o - C_p$	Predicted value for same event and location as $C_o$max	Highest Predicted Value for same event as $C_o$max (any location)	Highest Predicted Value for same location as $C_o$max (any event)	Observed value for same event and location as $C_p$max	Highest Observed value for same event as $C_p$max (any location)	Highest Observed value for same location as $C_p$max (any event)
MPTER (CRSTER, PLUME5)	1672.7(24,13)	1492.5(185,11)	180.2	1672.7	1672.7	215.1	-1467.9	-1467.9	-1035.5
MPSDM	1672.7(24,13)	2940.0(190,9)	-1267.3	1245.1	1245.1	-482.1	-2896.4	-2896.4	-2483.0
COMPTER	1672.7(24,13)	1529.0(185,11)	143.7	1672.7	1672.7	163.6	-1504.4	-1504.4	-1072.0
SCSTER	1672.7(24,13)	1374.4(65,13)	298.2	1672.7	1672.7	298.2	-1336.4	-898.4	+298.2
3141	1672.7(24,13)	727.8(186,11)	944.9	1672.7	1672.7	944.9	-727.8	-690.3	944.9
4141	1672.7(24,13)	727.8(186,11)	944.9	1672.7	1672.7	944.9	-727.8	-690.3	944.9
TEM 8A	1672.7(24,13)	1793.2(24,14)	-120.5	544.8	544.8	-120.5	-1596.2	-1596.2	-120.5
MULTIMAX	1672.7(24,13)	1383.7(65,13)	289.0	1672.7	1672.7	289.0	-1345.7	-907.7	289.0

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1975) AVERAGING TIME: 3 HOURS

SO_2 Concentration ($\mu g/m^3$)									
	Highest Observed value over all events and all locations	Highest Predicted value over all events and locations	Difference of Maximum Values	Difference between $C_o$max and -			Difference between C_o and $C_p$max, where C_o is-		
MODEL	$C_o$max (Day,Hour Ending)	$C_p$max (Day,Hour Ending)	$C_o - C_p$	Predicted value for same event and location as $C_o$max	Highest Predicted Value for same event as $C_o$max (any location)	Highest Predicted Value for same location as $C_o$max (any event)	Observed value for same event and location as $C_p$max	Highest Observed value for same event as $C_p$max (any location)	Highest Observed value for same location as $C_p$max (any event)
MPTER (CRSTER, PLUME5)	794.0(24,15)	741.1(51, 12)	52.9	794.0	794.0	155.6	-738.9	-506.1	-217.6
MPSDM	794.0(24,15)	1560.9(190,9)	-766.9	445.9	445.9	-98.5	-1535.4	-1535.4	-1323.8
COMPTER	794.0(24,15)	760.9(65,15)	33.1	794.0	794.0	33.1	-681.5	-597.2	33.1
SCSTER	794.0(24,15)	702.3(203,15)	91.7	794.0	794.0	263.0	-505.5	-505.5	-178.8
3141	794.0(24,15)	450.3(203,15)	343.7	794.0	794.0	451.1	-253.5	-253.5	73.2
4141	794.0(24,15)	450.3(203,15)	343.7	794.0	794.0	451.1	-253.5	-253.5	73.2
TEM 8A	794.0(24,15)	939.2(156,12)	-145.2	-57.9	-57.9	-145.2	-870.3	-804.3	-145.2
MULTIMAX	794.0(24,15)	692.6(203,15)	101.4	794.0	794.0	253.8	-495.8	-495.8	-169.1

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1975) AVERAGING TIME: 24 HOURS

SO_2 Concentration ($\mu g/m^3$)									
	Highest Observed value over all events and all locations $C_o$max (Day)	Highest Predicted value over all events and locations $C_p$max (Day)	Difference of Maximum Values	Difference between $C_o$max and - Predicted value for same event and location as $C_o$max	Highest Predicted Value for same event as $C_o$max (any location)	Highest Predicted Value for same location as $C_o$max (any event)	Difference between C_o and $C_p$max, where C_o is- Observed value for same event and location as $C_p$max	Highest Observed value for same event as $C_p$max (any location)	Highest Observed value for same location as as $C_p$max (any event)
MODEL			C_o-C_p						
MPTER (CRSTER, PLUME5)	209.5(24)	171.1(139)	38.4	209.1	209.1	38.4	-116.9	- 86.1	38.4
MPSDM	209.5(24)	195.2(139)	14.3	149.4	149.4	29.6	-186.7	-148.9	-153.7
COMPTER	209.5(24)	241.6(139)	-32.1	194.6	194.6	-32.1	-187.4	-156.6	-32.1
SCSTER	209.5(24)	106.6(203)	102.9	209.5	209.5	106.7	-66.8	-63.7	63.5
3141	209.5(24)	96.8(139)	112.7	209.5	206.4	112.7	-42.6	-11.8	112.7
4141	209.5(24)	96.8(139)	112.7	209.5	206.4	112.7	-42.6	-11.8	112.7
TEM 8A	209.5(24)	142.1(24)	67.3	67.3	67.3	67.3	67.3	67.3	67.3
MULTIMAX	209.5(24)	104.9(294)	104.6	209.5	209.5	113.0	-65.1	-62.0	65.2

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1976) AVERAGING TIME: 1 HOUR

SO_2 Concentration ($\mu g/m^3$)									
MODEL	Highest Observed value over all events and all locations $C_o$max (Day, Hour)	Highest Predicted value over all events and locations $C_p$max (Day, Hour)	Difference of Maximum Values $C_o - C_p$	Difference between $C_o$max and - Predicted value for same event and location as $C_o$max	Highest Predicted Value for same event as $C_o$max (any location)	Highest Predicted Value for same location as $C_o$max (any event)	Difference between C_o and $C_p$max, where C_o is- Observed value for same event and location as $C_p$max	Highest Observed value for same event as $C_p$max (any location)	Highest Observed value for same location as $C_p$max (any event)
MPTER (CRSTER, PLUME5)	950.8(302,13)	1422.4(120,13)	-471.6	950.8	950.8	-471.6	-1355.2	-1355.2	-471.6
MPSDM	950.8(302,13)	1512.1(350,11)	-561.3	950.8	847.1	-384.0	-1484.6	-1466.6	-665.1
COMPTER	950.8(302,13)	1438.8(225,9)	-488.0	950.8	950.8	-468.7	-1419.3	-1364.3	-591.8
SCSTER	950.8(302,13)	1422.2(120,13)	-471.4	950.8	950.8	-471.4	-1355.0	-1355.0	-471.4
3141	950.8(302,13)	841.3(120,13)	109.5	950.8	950.8	109.5	-774.1	-774.1	109.5
4141	950.8(302,13)	841.3(120,13)	109.5	950.8	950.8	109.5	-774.1	-774.1	109.5
TEM 8A	950.8(302,13)	1309.9(179,10)	-359.1	874.7	480.1	98.7	-1277.4	-1272.4	-462.9
MULTIMAX	950.8(302,13)	1398.7(120,13)	-447.9	950.8	950.8	-447.9	-1331.5	-1331.5	-447.9

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1976) AVERAGING TIME: 3 HOURS

SO_2 Concentration ($\mu g/m^3$)									
	Highest Observed value over all events and all locations $C_o$max	Highest Predicted value over all events and locations $C_p$max	Difference of Maximum Values	Difference between $C_o$max and - Predicted value for same event and location	Highest Predicted Value for same event as $C_o$max (any location)	Highest Predicted Value for same location as $C_o$max (any event)	Difference between C_o and $C_p$max, where C_o is- Observed value for same event and location as	Highest Observed value for same event	Highest Observed value for same location as $C_p$max (any event)
MODEL	(Day,Hour Ending)	(Day,Hour Ending)	C_o-C_p	as $C_o$max			Cp^{max}	as $C_p$max (any location)	
MPTER (CRSTER, PLUMES)	623.7(362,15)	856.0(181,15)	-232.3	615.6	615.6	36.5	-784.0	-592.3	-314.0
MPSDM	623.7(362,15)	947.1(179,12)	-323.4	615.2	605.4	-44.5	-935.4	-845.7	-405.1
COMPTER	623.7(362,15)	1008.4(181,15)	-384.7	610.8	499.6	18.4	-936.4	-744.7	-466.4
SCSTER	623.7(362,15)	657.0(105,15)	-33.3	621.0	621.0	164.4	-560.7	-346.7	-115.0
3141	623.7(362,15)	453.4(105.15)	170.3	586.6	586.6	327.4	-357.0	-143.0	88.6
4141	623.7(362,15)	453.4(105,15)	170.3	586.6	586.6	327.4	-357.0	-143.0	88.6
TEM 8A	623.7(362,15)	763.7(179,12)	-140.1	619.6	619.6	118.4	-752.0	-662.3	-221.7
MULTIMAX	623.7(362,15)	616.0(105,15)	7.6	619.7	619.7	277.7	-519.7	-305.7	-74.0

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1976) AVERAGING TIME: 24 HOURS

	SO_2 Concentration ($\mu g/m^3$)								
				Difference between $C_o$max and -			Difference between C_o and $C_p$max, where C_o is-		
MODEL	Highest Observed value over all events and all locations $C_o$max (Day)	Highest Predicted value over all events and locations $C_p$max (Day)	Difference of Maximum Values $C_o - C_p$	Predicted value for same event and location as $C_o$max	Highest Predicted Value for same event as $C_o$max (any location)	Highest Predicted Value for same location as $C_o$max (any event)	Observed value for same event and location as $C_p$max	Highest Observed value for same event as $C_p$max (any location)	Highest Observed value for same location as as $C_p$max (any event)
MPTER (CRSTER, PLUME5)	181.2(330)	248.7(181)	-67.5	173.3	169.5	28.8	-213.6	-168.2	-116.0
MPSDM	181.2(330)	178.7(105)	2.5	175.2	157.3	65.7	-143.7	-98.3	-46.0
COMPTER	181.2(330)	274.9(105)	-93.7	170.9	88.3	-17.6	-239.9	-194.5	-142.2
SCSTER	181.2(330)	203.8(105)	-22.5	178.5	178.5	85.4	-168.7	-123.3	-71.0
3141	181.2(330)	129.1(105)	52.2	152.6	152.6	106.1	-94.0	-48.6	3.7
4141	181.2(330)	129.1(105)	52.1	150.9	150.9	104.1	-94.0	-48.7	3.6
TEM 8A	181.2(330)	102.2(114)	79.0	177.3	177.3	85.1	-65.7	-22.6	30.5
MULTIMAX	181.2(330)	196.0(105)	-14.8	177.9	175.3	93.6	-160.9	-115.5	-63.2

APPENDIX E

Selected Model Evaluation Input Data

SELECTED MODEL EVALUATION INPUT DATA

The attached tables provide sets of daily hour-by-hour source, meteorological, and air quality data used as input to the rural model evaluations. These data are from the Clifty Creek Power Plant, located in Indiana. The sample data are provided to support case study analyses of days when high concentrations were measured in the Clifty Creek Power Plant monitoring network.

The days selected, and the basis for this selection are given in Table 1. The data represents measurements made on days with the highest and highest, second high 1-hour, 3-hour and 24-hour average SO_2 concentrations (excluding background) measured in the Clifty Creek monitoring program during 1975 and 1976.

TABLE 1

SELECTED DAYS OF DATA AND SELECTION CRITERIA

Date	Criterion	Hour Ending	Receptor	SO_2 Concentration($\mu g/m^3$) Excluding Background
1/24/75	H1	13	3	1672.7
1/24/75	H3	15	3	794.0
1/24/75	H24	24	3	209.5
4/23/75	H2H3	15	3	661.0
10/22/75	H2H24	24	1	187.0
12/22/75	H2H1	15	6	1008.7
2/24/76	H2H24	24	4	152.4
3/22/76	H2H1	16	2	888.3
10/15/76	H2H3	9	1	542.9
10/28/76	H1	13	5	950.8
11/25/76	H24	24	4	181.2
12/27/76	H3	15	4	623.7

H1, H3, H24 = Highest 1-,3-, and 24-hour average concentration (excluding background) for the given year, respectively.

H2H1, H2H3, H2H4 = Highest, second high 1-, 3-, and 24-hour average concentration (excluding background) for the given year, respectively.

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY SOURCE DATA
75/ 1/24

HOUR ENDING	SO2 EMISSION (G/S)			EXIT VELOCITY (M/S)			STACK TEMPERATUE (DEG K)		
	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3
1	3537.	3498.	3474.	52.55	52.55	51.98	445.4	445.4	445.4
2	3514.	3498.	3428.	52.21	52.55	51.29	445.4	445.4	445.4
3	3537.	3521.	3459.	52.55	52.90	51.75	445.4	445.4	445.4
4	3538.	3529.	3474.	52.55	53.01	51.98	445.4	445.4	445.4
5	3514.	3521.	3443.	52.21	52.90	51.52	445.4	445.4	445.4
6	3530.	3514.	3459.	52.44	52.78	51.75	445.4	445.4	445.4
7	3545.	3529.	3451.	52.67	53.01	51.63	445.4	445.4	445.4
8	3443.	3537.	3505.	51.17	53.13	52.44	445.4	445.4	445.4
9	3451.	3537.	3551.	51.29	53.13	53.13	445.4	445.4	445.4
10	3451.	3514.	3520.	51.29	52.78	52.67	445.4	445.4	445.4
11	3483.	3521.	3497.	51.75	52.90	52.32	445.4	445.4	445.4
12	3444.	3521.	3505.	51.75	52.90	52.44	445.4	445.4	445.4
13	3491.	3537.	3482.	51.86	53.13	52.09	445.4	445.4	445.4
14	3523.	3506.	3497.	52.32	52.67	52.32	445.4	445.4	445.4
15	3500.	3483.	3513.	51.98	52.32	52.55	445.4	445.4	445.4
16	3508.	3468.	3513.	52.09	52.09	52.55	445.4	445.4	445.4
17	3531.	3445.	3482.	52.44	51.75	52.09	445.4	445.4	445.4
18	3539.	3445.	3520.	52.55	51.75	52.67	445.4	445.4	445.4
19	3531.	3430.	3520.	52.44	51.52	52.67	445.4	445.4	445.4
20	3532.	3445.	3535.	52.44	51.75	52.90	445.4	445.4	445.4
21	3532.	3445.	3520.	52.44	51.75	52.67	445.4	445.4	445.4
22	3539.	3445.	3513.	52.55	51.75	52.55	445.4	445.4	445.4
23	3531.	3407.	3490.	52.44	51.17	52.21	445.4	445.4	445.4
24	3570.	3445.	3513.	53.01	51.75	52.55	445.4	445.4	445.4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY METEOROLOGY
(CLIFTY CREEK SURFACE/DAYTON UPPER AIR)
75/ 1/24

HOUR ENDING	WIND DIR DEG	WIND SP M/S	TEMP DEG K	MIX HEIGHT METERS	STAB CLASS
1	219.	2.09	271.48	681.34	4
2	208.	1.83	271.48	655.86	4
3	195.	2.09	271.48	630.37	4
4	195.	1.57	271.48	604.88	4
5	190.	1.83	271.48	579.39	4
6	192.	2.09	271.48	553.90	4
7	189.	2.09	271.48	528.42	4
8	191.	2.61	270.93	502.93	4
9	187.	2.61	270.93	477.44	4
10	185.	3.20	271.48	451.95	3
11	184.	2.62	273.15	426.46	3
12	175.	2.87	275.37	400.98	4
13	188.	2.62	277.59	375.49	3
14	190.	2.91	278.71	350.00	3
15	198.	2.87	279.82	350.00	4
16	193.	2.61	280.37	350.00	4
17	180.	2.35	280.37	350.00	4
18	176.	2.35	280.37	351.67	5
19	177.	3.05	279.82	357.53	5
20	178.	3.92	279.82	363.40	4
21	182.	3.92	279.82	369.27	4
22	189.	4.18	279.82	375.13	4
23	192.	4.18	279.82	381.00	4
24	194.	4.44	279.82	386.87	4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY MEASURED SO2 CONCENTRATIONS (UG/M**3)
75/ 1/24

HOUR ENDING	(1) BACON RIDGE	(2) RYKERS RIDGE	(3) NORTH MADISON	(4) HEBRON CHURCH	(5) LIBERTY RIDGE	(6) CANIP CREEK	CALCULATED BACKGROUND
1	172.	282.	420.	201.	227.	73.	150.0
2	238.	240.	235.	151.	308.	154.	236.0
3	420.	224.	315.	128.	266.	175.	220.5
4	172.	190.	274.	164.	238.	145.	211.5
5	146.	188.	338.	151.	222.	188.	199.3
6	149.	157.	256.	224.	167.	133.	150.0
7	149.	120.	211.	245.	135.	107.	120.0
8	76.	88.	211.	337.	102.	81.	91.5
9	65.	97.	135.	238.	110.	81.	96.0
10	70.	89.	251.	365.	89.	70.	82.7
11	94.	91.	339.	391.	125.	96.	100.7
12	97.	188.	552.	162.	243.	128.	185.5
13	85.	97.	1772.	368.	112.	89.	99.3
14	23.	31.	658.	232.	57.	34.	40.7
15	25.	37.	130.	37.	68.	39.	48.8
16	29.	52.	214.	63.	70.	50.	60.0
17	31.	26.	94.	37.	34.	23.	27.7
18	21.	19.	39.	18.	34.	23.	25.0
19	37.	50.	65.	34.	76.	37.	54.5
20	34.	33.	81.	34.	55.	34.	42.7
21	25.	37.	94.	29.	55.	34.	42.3
22	29.	37.	444.	65.	52.	34.	41.0
23	26.	29.	227.	81.	44.	29.	35.3
24	26.	21.	50.	206.	42.	23.	32.5

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY SOURCE DATA
75/ 9/23

HOUR ENDING	SO2 EMISSION (G/S)			EXIT VELOCITY (M/S)			STACK TEMPERATUE (DEG K)		
	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3
1	2321.	2299.	2372.	37.37	37.49	38.52	445.4	445.4	445.4
2	2279.	2292.	2301.	36.68	37.37	37.37	445.4	445.4	445.4
3	2257.	2285.	2273.	36.34	37.25	36.91	445.4	445.4	445.4
4	2257.	2278.	2273.	36.34	37.14	36.91	445.4	445.4	445.4
5	2250.	2285.	2256.	36.22	37.26	36.80	445.4	445.4	445.4
6	2221.	2250.	2252.	35.76	36.69	36.57	445.4	445.4	445.4
7	2237.	2187.	2198.	36.91	35.65	35.53	445.4	445.4	445.4
8	2575.	2095.	2082.	41.28	34.15	33.91	445.4	445.4	445.4
9	2604.	2151.	2117.	41.74	35.07	34.38	445.4	445.4	445.4
10	2653.	2151.	2166.	42.55	35.07	35.19	445.4	445.4	445.4
11	2618.	2165.	2110.	41.97	35.30	34.27	445.4	445.4	445.4
12	2680.	2158.	2046.	43.29	35.19	33.23	445.4	445.4	445.4
13	2667.	2165.	2138.	43.12	35.30	34.73	445.4	445.4	445.4
14	2689.	2172.	2195.	43.47	35.42	35.65	445.4	445.4	445.4
15	2275.	2533.	2124.	36.68	41.23	34.50	445.4	445.4	445.4
16	2214.	2611.	2159.	35.65	42.55	35.07	445.4	445.4	445.4
17	2229.	2603.	2138.	35.88	42.43	34.73	445.4	445.4	445.4
18	2257.	2503.	2195.	36.34	40.82	35.65	445.4	445.4	445.4
19	2222.	2468.	2209.	35.76	40.23	35.88	445.4	445.4	445.4
20	2243.	2222.	2450.	36.11	36.22	39.79	445.4	445.4	445.4
21	2136.	2236.	2563.	34.38	36.45	41.63	445.4	445.4	445.4
22	2093.	2222.	2605.	33.69	36.22	42.32	445.4	445.4	445.4
23	2185.	2208.	2386.	35.19	35.93	38.75	445.4	445.4	445.4
24	2234.	2201.	2301.	35.99	35.83	37.37	445.4	445.4	445.4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY METEOROLOGY
(CLIFTY CREEK SURFACE/DAYTON UPPER AIR)
75/ 9/23

HOUR ENDING	WIND DIR DEG	WIND SP M/S	TEMP DEG K	MIX HEIGHT METERS	STAB CLASS
1	192.	2.81	289.26	1475.12	6
2	198.	3.05	289.26	1365.50	5
3	185.	3.28	288.71	1255.87	5
4	192.	4.44	288.15	1146.25	4
5	183.	4.70	288.15	1036.62	4
6	184.	4.18	288.15	927.00	4
7	184.	4.70	288.15	817.37	4
8	198.	4.70	288.71	707.75	4
9	210.	4.44	288.71	598.12	4
10	216.	4.44	286.48	488.50	4
11	199.	6.27	284.82	378.87	4
12	197.	8.36	284.82	269.25	4
13	187.	8.36	286.48	159.62	4
14	188.	6.79	286.48	50.00	4
15	190.	6.79	285.93	50.00	4
16	196.	7.57	285.93	50.00	4
17	191.	7.84	287.04	50.00	4
18	208.	5.22	288.71	50.00	4
19	208.	4.44	288.71	50.00	4
20	194.	3.75	288.71	68.77	5
21	190.	4.18	288.15	94.89	4
22	175.	4.18	288.15	121.02	4
23	181.	4.18	288.15	147.14	4
24	193.	3.66	288.15	173.26	4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY MEASURED SO2 CONCENTRATIONS (UG/M**3)
75/ 9/23

HOUR ENDING	(1) BACON RIDGE	(2) RYKERS RIDGE	(3) NORTH MADISON	(4) HEBRON CHURCH	(5) LIBERTY RIDGE	(6) CANIP CREEK	CALCULATED BACKGROUND
1	37.	13.	31.	23.	18.	13.	19.7
2	23.	13.	26.	18.	16.	5.	11.3
3	21.	13.	21.	16.	16.	3.	10.7
4	21.	13.	26.	16.	18.	3.	11.3
5	18.	13.	21.	16.	13.	3.	9.7
6	21.	13.	37.	16.	13.	3.	9.7
7	18.	13.	50.	16.	13.	8.	11.3
8	21.	16.	151.	50.	16.	16.	16.0
9	264.	21.	39.	110.	29.	18.	23.5
10	98.	154.	29.	26.	31.	34.	32.3
11	89.	18.	70.	107.	31.	18.	24.5
12	8.	3.	159.	26.	5.	3.	3.7
13	3.	3.	624.	13.	3.	3.	3.0
14	3.	3.	676.	10.	3.	3.	3.0
15	3.	3.	692.	10.	3.	3.	3.0
16	3.	3.	454.	18.	3.	3.	3.0
17	3.	3.	475.	191.	3.	3.	3.0
18	425.	3.	31.	16.	3.	3.	3.0
19	211.	3.	16.	13.	3.	3.	3.0
20	13.	3.	44.	295.	3.	3.	3.0
21	5.	3.	107.	37.	3.	3.	3.0
22	3.	3.	8.	13.	3.	3.	3.0
23	3.	3.	10.	10.	3.	3.	3.0
24	10.	3.	191.	120.	3.	3.	3.0

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY SOURCE DATA
75/10/22

HOUR ENDING	SO2 EMISSION (G/S)			EXIT VELOCITY (M/S)			STACK TEMPERATUE (DEG K)		
	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3
1	1512.	2622.	3108.	24.95	44.05	51.98	445.4	445.4	445.4
2	1569.	2890.	3040.	25.41	48.53	50.83	445.4	445.4	445.4
3	1569.	3034.	3067.	25.41	50.99	51.29	445.4	445.4	445.4
4	1569.	3020.	3060.	25.41	50.71	51.17	445.4	445.4	445.4
5	240.	3021.	3040.	24.95	50.71	50.83	445.4	445.4	445.4
6	14.	2986.	3012.	24.95	50.14	50.37	445.4	445.4	445.4
7	14.	3014.	3012.	24.95	50.60	50.37	445.4	445.4	445.4
8	14.	2980.	3088.	24.95	50.03	51.63	445.4	445.4	445.4
9	14.	2986.	3074.	24.95	50.14	51.40	445.4	445.4	445.4
10	14.	3007.	3088.	24.95	50.48	51.63	445.4	445.4	445.4
11	14.	3021.	3067.	24.95	50.71	51.29	445.4	445.4	445.4
12	14.	3007.	3095.	24.95	50.48	51.75	445.4	445.4	445.4
13	14.	2980.	3060.	24.95	50.03	51.17	445.4	445.4	445.4
14	14.	3014.	3074.	24.95	50.60	51.40	445.4	445.4	445.4
15	14.	3027.	3053.	24.95	50.83	51.06	445.4	445.4	445.4
16	14.	3041.	3053.	24.95	51.05	51.06	445.4	445.4	445.4
17	14.	3027.	3047.	24.95	50.83	50.94	445.4	445.4	445.4
18	14.	3014.	3053.	24.95	50.60	51.06	445.4	445.4	445.4
19	14.	2973.	3060.	24.95	49.91	51.17	445.4	445.4	445.4
20	14.	3000.	3033.	24.95	50.37	50.71	445.4	445.4	445.4
21	14.	2993.	3026.	24.95	50.25	50.60	445.4	445.4	445.4
22	14.	2979.	3026.	24.95	50.03	50.60	445.4	445.4	445.4
23	14.	2986.	3040.	24.95	50.14	50.83	445.4	445.4	445.4
24	14.	3000.	3033.	24.95	50.37	50.71	445.4	445.4	445.4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY METEOROLOGY
(CLIFTY CREEK SURFACE/DAYTON UPPER AIR)
75/10/22

HOUR ENDING	WIND DIR DEG	WIND SP M/S	TEMP DEG K	MIX HEIGHT METERS	STAB CLASS
1	205.	3.40	288.15	1221.29	4
2	203.	3.66	287.59	1212.89	4
3	205.	3.28	287.59	1204.48	5
4	208.	3.28	287.04	1196.07	5
5	206.	3.05	286.48	1187.66	5
6	201.	3.05	285.93	1179.26	5
7	194.	3.66	285.93	5.96	4
8	194.	3.66	285.93	163.97	4
9	196.	3.66	286.15	321.97	4
10	205.	3.66	290.37	479.98	4
11	209.	2.87	292.59	637.98	4
12	210.	3.13	294.26	795.99	4
13	199.	3.13	295.37	953.99	4
14	202.	3.66	295.93	1112.00	4
15	196.	4.18	296.48	1112.00	4
16	199.	3.92	297.04	1112.00	4
17	202.	3.40	296.48	1112.00	4
18	193.	2.81	294.26	1115.37	5
19	192.	3.28	292.04	1130.65	6
20	193.	3.75	290.93	1145.94	5
21	189.	3.99	290.37	1161.22	6
22	192.	3.52	289.82	1176.50	6
23	197.	3.05	288.15	1191.78	6
24	198.	3.28	287.59	1207.06	6

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY MEASURED SO2 CONCENTRATIONS (UG/M**3)
75/10/22

HOUR ENDING	(1) BACON RIDGE	(2) RYKERS RIDGE	(3) NORTH MADISON	(4) HEBRON CHURCH	(5) LIBERTY RIDGE	(6) CANIP CREEK	CALCULATED BACKGROUND
1	569.	91.	97.	77.	104.	55.	79.5
2	299.	99.	123.	89.	91.	47.	69.0
3	397.	96.	97.	77.	104.	76.	90.0
4	465.	81.	94.	65.	104.	86.	95.0
5	496.	81.	91.	60.	112.	97.	104.5
6	394.	69.	102.	65.	123.	94.	108.5
7	305.	84.	104.	125.	104.	91.	97.5
8	183.	84.	99.	227.	102.	89.	95.5
9	478.	78.	99.	73.	107.	91.	99.0
10	619.	81.	94.	63.	104.	84.	94.0
11	525.	73.	86.	57.	91.	76.	83.5
12	373.	60.	69.	44.	76.	70.	73.0
13	444.	65.	149.	245.	102.	84.	93.0
14	125.	78.	175.	368.	94.	78.	86.0
15	70.	42.	261.	292.	50.	52.	51.0
16	50.	31.	50.	298.	37.	23.	30.0
17	39.	26.	50.	177.	34.	26.	30.0
18	37.	23.	39.	42.	31.	26.	28.5
19	26.	16.	21.	21.	16.	16.	16.0
20	18.	18.	15.	13.	18.	10.	15.3
21	31.	23.	21.	18.	23.	21.	22.3
22	23.	18.	57.	117.	21.	18.	19.5
23	18.	16.	29.	86.	18.	13.	15.5
24	16.	13.	37.	70.	16.	8.	12.3

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY SOURCE DATA
75/12/22

HOUR ENDING	SO2 EMISSION (G/S)			EXIT VELOCITY (M/S)			STACK TEMPERATUE (DEG K)		
	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3
1	3259.	3137.	3299.	52.35	51.17	53.59	445.4	445.4	445.4
2	3251.	3166.	3285.	52.44	51.63	53.36	445.4	445.4	445.4
3	3237.	3159.	3292.	52.21	51.52	53.47	445.4	445.4	445.4
4	3250.	3166.	3270.	52.44	51.63	53.13	445.4	445.4	445.4
5	3244.	3173.	3256.	52.32	51.75	52.90	445.4	445.4	445.4
6	3240.	3180.	3263.	52.90	51.86	53.01	445.4	445.4	445.4
7	3246.	3165.	3305.	52.32	51.63	53.70	445.4	445.4	445.4
8	3268.	3187.	3292.	52.67	51.98	53.47	445.4	445.4	445.4
9	3266.	3166.	3299.	52.67	51.63	53.59	445.4	445.4	445.4
10	3237.	3159.	3299.	52.21	51.52	53.59	445.4	445.4	445.4
11	3209.	3151.	3292.	51.75	51.40	53.47	445.4	445.4	445.4
12	3238.	3151.	3285.	52.21	51.40	53.36	445.4	445.4	445.4
13	3224.	3151.	3270.	51.98	51.40	53.13	445.4	445.4	445.4
14	3217.	3130.	3278.	51.86	51.06	53.24	445.4	445.4	445.4
15	3238.	3130.	3270.	52.21	51.06	53.13	445.4	445.4	445.4
16	3231.	3130.	3278.	52.09	51.06	53.24	445.4	445.4	445.4
17	3245.	3109.	3263.	52.32	50.71	53.01	445.4	445.4	445.4
18	3231.	3109.	3263.	52.09	50.71	53.01	445.4	445.4	445.4
19	3253.	3081.	3270.	52.44	50.25	53.13	445.4	445.4	445.4
20	3303.	3088.	3292.	53.24	50.37	53.47	445.4	445.4	445.4
21	3275.	3095.	3270.	52.78	50.48	53.13	445.4	445.4	445.4
22	3253.	3088.	3256.	52.44	50.37	52.90	445.4	445.4	445.4
23	3074.	3081.	3242.	49.57	50.25	52.67	445.4	445.4	445.4
24	2887.	3102.	3270.	46.69	50.60	53.13	445.4	445.4	445.4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY METEOROLOGY
(CLIFTY CREEK SURFACE/DAYTON UPPER AIR)
75/12/22

HOUR ENDING	WIND DIR DEG	WIND SP M/S	TEMP DEG K	MIX HEIGHT METERS	STAB CLASS
1	72.	1.54	264.82	715.12	5
2	68.	1.41	264.26	721.57	5
3	72.	1.17	263.71	728.02	5
4	52.	.94	264.26	734.48	5
5	68.	1.83	264.26	740.93	4
6	63.	1.83	264.26	747.38	4
7	82.	1.41	263.71	753.83	5
8	74.	1.05	263.15	1.25	4
9	102.	.78	263.15	134.21	4
10	158.	.78	264.82	267.17	4
11	197.	1.16	266.48	400.12	3
12	175.	1.16	268.15	533.09	3
13	125.	.65	269.82	666.04	2
14	289.	1.45	269.82	799.00	3
15	319.	.97	271.48	799.00	3
16	249.	1.05	272.04	799.00	4
17	265.	.87	271.48	799.00	3
18	331.	1.57	269.26	794.60	4
19	319.	1.17	268.71	788.87	5
20	309.	.94	267.59	783.14	6
21	265.	.70	267.04	777.41	6
22	218.	1.41	266.48	771.68	7
23	246.	1.41	265.93	765.95	7
24	275.	1.41	265.37	760.22	7

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY MEASURED SO2 CONCENTRATIONS (UG/M**3)
75/12/22

HOUR ENDING	(1) BACON RIDGE	(2) AYKERS RIDGE	(3) NORTH MADISON	(4) HEPRON CHURCH	(5) LIBERTY RIDGE	(6) CANIP CREEK	CALCULATED BACKGROUND
1	15.	8.	5.	10.	5.	3.	7.5
2	15.	5.	8.	10.	8.	3.	7.4
3	21.	4.	8.	-1.	5.	3.	9.0
4	102.	15.	15.	34.	10.	3.	29.7
5	128.	42.	76.	73.	29.	-1.	59.6
6	256.	47.	68.	115.	42.	13.	90.2
7	305.	125.	86.	130.	29.	16.	115.2
8	300.	164.	149.	151.	34.	21.	136.5
9	289.	141.	157.	185.	50.	26.	142.2
10	259.	125.	144.	201.	47.	42.	134.5
11	191.	209.	217.	146.	91.	102.	96.3
12	149.	154.	104.	172.	193.	193.	176.7
13	146.	136.	133.	130.	201.	180.	154.3
14	154.	149.	68.	112.	692.	172.	235.0
15	130.	55.	31.	73.	258.	1081.	72.2
16	73.	112.	26.	38.	59.	676.	32.5
17	44.	219.	25.	29.	26.	99.	25.0
18	44.	23.	25.	26.	21.	86.	40.9
19	34.	21.	18.	21.	21.	42.	23.5
20	31.	18.	16.	23.	16.	29.	22.0
21	26.	16.	18.	18.	16.	21.	17.5
22	26.	15.	15.	16.	16.	29.	22.5
23	26.	16.	16.	16.	16.	29.	16.0
24	21.	19.	16.	16.	16.	23.	17.2

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY SOURCE DATA
76/ 2/24

HOUR ENDING	SO2 EMISSION (G/S)			EXIT VELOCITY (M/S)			STACK TEMPERATUE (DEG K)		
	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3
1	3053.	2997.	1458.	52.67	52.32	25.30	445.4	445.4	445.4
2	3047.	2958.	1458.	52.30	51.63	25.30	445.4	445.4	445.4
3	3053.	2978.	1465.	52.67	51.99	25.41	445.4	445.4	445.4
4	3040.	2978.	1458.	52.44	51.98	25.30	445.4	445.4	445.4
5	3040.	2965.	1452.	52.44	51.75	25.18	445.4	445.4	445.4
6	3047.	2925.	1458.	52.55	51.06	25.30	445.4	445.4	445.4
7	3080.	2978.	1465.	53.13	51.99	25.41	445.4	445.4	445.4
8	3021.	2991.	1465.	52.09	52.21	25.41	445.4	445.4	445.4
9	3021.	2925.	1458.	52.09	51.06	25.30	445.4	445.4	445.4
10	3007.	2958.	1465.	51.86	51.63	25.41	445.4	445.4	445.4
11	3007.	2951.	1465.	51.86	51.52	25.41	445.4	445.4	445.4
12	2987.	2958.	1452.	51.52	51.63	25.18	445.4	445.4	445.4
13	2975.	2978.	1452.	51.29	51.99	25.18	445.4	445.4	445.4
14	2982.	2978.	1458.	50.71	51.99	25.30	445.4	445.4	445.4
15	2995.	2958.	1458.	51.63	51.29	25.30	445.4	445.4	445.4
16	2987.	2971.	1458.	51.52	51.86	25.30	445.4	445.4	445.4
17	3008.	2984.	1465.	51.86	52.09	25.41	445.4	445.4	445.4
18	3014.	2998.	1452.	51.98	52.32	25.18	445.4	445.4	445.4
19	3007.	2958.	1458.	51.86	51.63	25.30	445.4	445.4	445.4
20	2995.	3011.	1445.	51.63	52.55	25.07	445.4	445.4	445.4
21	2981.	3011.	1465.	51.40	52.55	25.41	445.4	445.4	445.4
22	3001.	3011.	1452.	51.75	52.55	25.18	445.4	445.4	445.4
23	3008.	3011.	1445.	51.86	52.55	25.07	445.4	445.4	445.4
24	3014.	3004.	1458.	51.98	52.44	25.30	445.4	445.4	445.4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY METEOROLOGY
(CLIFTY CREEK SURFACE/DAYTON UPPER AIR)
76/ 2/24

HOUR ENDING	WIND DIR DEG	WIND SP M/S	TEMP DEG K	MIX HEIGHT METERS	STAB CLASS
1	212.	5.75	274.26	1292.88	5
2	211.	5.66	274.26	1250.04	4
3	204.	5.52	274.26	1207.20	5
4	200.	5.35	274.26	1164.37	5
5	199.	5.66	273.71	1121.53	4
6	199.	5.52	274.26	1078.69	5
7	199.	5.75	274.82	1035.86	5
8	202.	4.18	275.37	66.96	4
9	203.	4.70	277.04	178.47	4
10	209.	4.44	279.26	289.97	4
11	209.	5.66	282.59	401.48	4
12	211.	5.13	285.37	512.99	4
13	208.	5.92	287.59	624.49	4
14	209.	4.44	288.71	736.00	4
15	209.	4.70	289.82	736.00	4
16	211.	4.18	291.48	736.00	4
17	210.	4.70	290.93	736.00	4
18	207.	4.44	290.37	736.00	4
19	195.	4.70	288.71	733.13	4
20	197.	4.69	287.59	728.92	5
21	195.	4.95	287.04	724.70	4
22	196.	4.96	285.93	720.48	4
23	201.	5.49	285.37	716.26	4
24	206.	4.96	285.37	712.05	4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY MEASURED SO2 CONCENTRATIONS (UG/M**3)
76/ 2/24

HOUR ENDING	(1) BACON RIDGE	(2) RYKERS RIDGE	(3) NORTH MADISON	(4) HEBRON CHURCH	(5) LIBERTY RIDGE	(6) CANIP CREEK	CALCULATED BACKGROUND
1	457.	93.	55.	86.	31.	26.	28.5
2	350.	110.	73.	94.	34.	23.	28.5
3	209.	112.	70.	-1.	47.	18.	32.5
4	130.	78.	57.	185.	57.	16.	36.5
5	99.	57.	58.	389.	25.	-1.	25.0
6	110.	69.	44.	279.	25.	-1.	26.0
7	93.	63.	39.	311.	39.	-1.	39.0
8	107.	76.	55.	269.	60.	-1.	60.0
9	110.	78.	58.	311.	78.	3.	49.5
10	292.	97.	91.	94.	110.	3.	56.5
11	621.	110.	99.	97.	123.	-1.	123.0
12	663.	104.	99.	91.	-1.	86.	86.0
13	566.	104.	89.	110.	110.	91.	100.5
14	261.	94.	102.	251.	104.	81.	92.5
15	110.	86.	133.	459.	84.	60.	72.0
16	81.	52.	86.	452.	47.	29.	38.0
17	47.	29.	39.	358.	29.	18.	23.5
18	44.	26.	29.	188.	26.	13.	19.5
19	21.	5.	18.	39.	3.	3.	3.0
20	13.	5.	29.	3.	5.	3.	4.0
21	16.	10.	73.	8.	8.	3.	5.5
22	16.	13.	123.	8.	13.	3.	8.0
23	13.	8.	91.	84.	8.	3.	5.5
24	13.	8.	10.	248.	8.	3.	5.5

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY SOURCE DATA
76/ 5/22

HOUR ENDING	SO2 EMISSION (G/S)			EXIT VELOCITY (M/S)			STACK TEMPERATUE (DEG K)		
	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3
1	3291.	3239.	1647.	52.90	52.67	26.68	445.4	445.4	445.4
2	3291.	3196.	1647.	52.90	51.98	26.58	445.4	445.4	445.4
3	3298.	3205.	1654.	53.01	52.09	26.79	445.4	445.4	445.4
4	3291.	3217.	1661.	52.90	52.32	26.91	445.4	445.4	445.4
5	3305.	3239.	1668.	53.13	52.67	27.02	445.4	445.4	445.4
6	3305.	3232.	1668.	53.13	52.55	27.02	445.4	445.4	445.4
7	3312.	3210.	1668.	53.24	52.21	27.02	445.4	445.4	445.4
8	3326.	3260.	1675.	53.47	53.01	27.14	445.4	445.4	445.4
9	3306.	3239.	1668.	53.13	52.67	27.02	445.4	445.4	445.4
10	3312.	3246.	1668.	53.24	52.78	27.02	445.4	445.4	445.4
11	3291.	3239.	1668.	52.90	52.67	27.02	445.4	445.4	445.4
12	3298.	3253.	1668.	53.01	52.90	27.02	445.4	445.4	445.4
13	3291.	3239.	1668.	52.90	52.67	27.02	445.4	445.4	445.4
14	3312.	3225.	1668.	53.24	52.44	27.02	445.4	445.4	445.4
15	3291.	3232.	1668.	52.90	52.55	27.02	445.4	445.4	445.4
16	3291.	3232.	1668.	52.90	52.55	27.02	445.4	445.4	445.4
17	3320.	3239.	1675.	53.36	52.67	27.14	445.4	445.4	445.4
18	3291.	3232.	1689.	52.90	52.55	27.37	445.4	445.4	445.4
19	3270.	3203.	1689.	52.55	52.09	27.37	445.4	445.4	445.4
20	3298.	3210.	1689.	53.01	52.21	27.37	445.4	445.4	445.4
21	3305.	3225.	1689.	53.13	52.44	27.37	445.4	445.4	445.4
22	3291.	3210.	1668.	52.90	52.21	27.02	445.4	445.4	445.4
23	3291.	3189.	1682.	52.90	51.86	27.25	445.4	445.4	445.4
24	3305.	3239.	1682.	53.13	52.67	27.25	445.4	445.4	445.4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY METEOROLOGY
(CLIFTY CREEK SURFACE/DAYTON UPPER AIR)
76/ 5/22

HOUR ENDING	WIND DIR DEG	WIND SP M/S	TEMP DEG K	MIX HEIGHT METERS	STAR CLASS
1	22.	.70	273.71	1400.41	5
2	80.	.47	272.04	1413.99	6
3	96.	.47	272.04	1427.58	7
4	86.	.70	272.59	1441.16	6
5	83.	2.11	272.04	1454.74	6
6	85.	2.81	272.04	1468.33	6
7	92.	2.81	271.48	61.70	5
8	110.	3.13	272.59	278.17	4
9	119.	2.04	274.26	494.65	3
10	125.	2.91	275.37	711.12	2
11	128.	1.94	277.59	927.59	2
12	114.	1.30	280.37	1144.06	2
13	114.	.97	282.04	1360.53	2
14	245.	1.30	282.59	1577.00	2
15	281.	1.94	282.59	1577.00	2
16	250.	1.16	284.26	1577.00	3
17	276.	1.62	284.26	1577.00	2
18	310.	1.16	283.15	1577.00	3
19	296.	.78	281.48	1593.15	4
20	340.	1.88	280.93	1611.93	5
21	6.	1.91	280.37	1640.71	5
22	336.	1.64	279.26	1669.50	5
23	347.	2.09	278.71	1698.28	4
24	356.	2.39	278.71	1727.06	4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY MEASURED SO2 CONCENTRATIONS (UG/M**3)
76/ 3/22

HOUR ENDING	(1) BACON RIDGE	(2) RYKERS RIDGE	(3) NORTH MADISON	(4) HEBRON CHURCH	(5) LIBERTY RIDGE	(5) CANIP CREEK	CALCULATED BACKGROUND
1	13.	21.	5.	3.	13.	-1.	10.5
2	13.	23.	3.	3.	8.	-1.	10.0
3	13.	21.	5.	-1.	8.	-1.	11.7
4	10.	16.	10.	13.	3.	-1.	10.9
5	8.	13.	5.	10.	3.	-1.	7.8
6	8.	16.	8.	10.	3.	-1.	9.0
7	8.	16.	5.	10.	5.	-1.	8.8
8	10.	15.	10.	10.	13.	3.	10.3
9	37.	18.	10.	16.	10.	3.	15.7
10	29.	23.	13.	21.	23.	10.	19.8
11	23.	44.	23.	23.	60.	13.	31.0
12	16.	31.	26.	34.	94.	13.	35.7
13	16.	29.	97.	26.	89.	13.	45.8
14	16.	104.	506.	39.	39.	44.	272.5
15	37.	590.	290.	140.	15.	196.	123.3
16	266.	937.	13.	120.	13.	65.	98.7
17	154.	478.	73.	26.	3.	16.	64.0
18	13.	582.	44.	23.	3.	50.	165.5
19	13.	291.	10.	23.	3.	527.	50.0
20	13.	21.	3.	21.	3.	144.	40.4
21	31.	23.	3.	26.	3.	23.	21.2
22	21.	29.	3.	23.	3.	13.	17.9
23	3.	16.	3.	18.	3.	10.	10.0
24	3.	16.	3.	16.	3.	3.	9.2

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY SOURCE DATA
76/10/15

HOUR ENDING	SO2 EMISSION (G/S)			EXIT VELOCITY (M/S)			STACK TEMPERATUE (DEG K)		
	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3
1	3330.	2949.	3289.	51.75	46.34	51.52	445.4	445.4	445.4
2	3337.	3000.	3326.	51.86	47.15	52.09	445.4	445.4	445.4
3	3361.	3029.	3333.	51.29	47.61	52.21	445.4	445.4	445.4
4	3330.	3236.	3348.	51.75	47.72	52.44	445.4	445.4	445.4
5	3323.	3014.	3355.	51.63	47.38	52.55	445.4	445.4	445.4
6	3270.	2992.	3348.	50.83	47.03	52.44	445.4	445.4	445.4
7	3322.	3029.	3362.	51.63	47.61	52.67	445.4	445.4	445.4
8	3323.	3298.	3340.	51.63	51.86	52.32	445.4	445.4	445.4
9	3315.	3305.	3340.	51.52	51.98	52.32	445.4	445.4	445.4
10	3315.	3320.	3326.	51.52	52.21	52.09	445.4	445.4	445.4
11	3271.	3240.	3309.	50.83	50.99	51.75	445.4	445.4	445.4
12	3294.	3254.	3282.	51.17	51.17	51.40	445.4	445.4	445.4
13	3257.	3305.	3245.	50.60	51.98	50.83	445.4	445.4	445.4
14	3279.	3262.	3245.	50.94	51.29	50.83	445.4	445.4	445.4
15	3272.	3269.	3252.	50.83	51.40	50.94	445.4	445.4	445.4
16	3265.	3254.	3260.	50.71	51.17	51.06	445.4	445.4	445.4
17	3257.	3262.	3311.	50.60	51.23	51.86	445.4	445.4	445.4
18	3265.	3247.	3304.	50.71	51.06	51.75	445.4	445.4	445.4
19	3250.	3247.	3318.	50.48	51.06	51.98	445.4	445.4	445.4
20	3250.	3240.	3311.	50.48	50.99	51.86	445.4	445.4	445.4
21	3250.	3240.	3289.	50.48	50.94	51.52	445.4	445.4	445.4
22	3265.	3240.	3304.	50.71	50.94	51.75	445.4	445.4	445.4
23	3272.	3254.	3311.	50.83	51.17	51.86	445.4	445.4	445.4
24	3250.	2978.	3318.	50.48	46.90	51.98	445.4	445.4	445.4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY METEOROLOGY
(CLIFTY CREEK SURFACE/DAYTON UPPER AIR)
76/10/15

HOUR ENDING	WIND DIR DEG	WIND SP M/S	TEMP . DEG K	MIX HEIGHT METERS	STAB CLASS
1	184.	3.52	283.15	1464.20	5
2	198.	3.52	282.59	1393.34	5
3	185.	3.52	282.59	1322.47	5
4	183.	3.52	282.59	1251.61	5
5	185.	3.52	282.59	1180.75	5
6	186.	3.75	283.15	1109.89	5
7	192.	3.92	283.15	10.99	4
8	184.	3.56	284.82	86.99	4
9	196.	4.18	287.59	162.99	4
10	210.	3.40	290.93	238.99	4
11	225.	3.66	293.71	315.00	4
12	233.	4.44	294.82	391.00	4
13	222.	4.44	295.93	467.00	4
14	254.	4.44	296.48	543.00	4
15	262.	4.44	295.48	543.00	4
16	259.	4.44	295.37	543.00	4
17	287.	4.18	293.71	543.00	4
18	310.	3.56	290.37	547.26	4
19	302.	2.91	288.71	599.55	5
20	299.	2.91	287.59	651.83	5
21	322.	3.28	286.48	704.12	5
22	332.	3.28	284.82	756.41	5
23	332.	2.11	283.15	808.70	6
24	318.	1.41	280.93	860.98	6

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY MEASURED SO2 CONCENTRATIONS (UG/M**3)
76/10/15

HOUR ENDING	(1) BACON RIDGE	(2) RYKERS RIDGE	(3) NORTH MADISON	(4) HEBRON CHURCH	(5) LIBERTY RIDGE	(6) CANIP CREEK	CALCULATED BACKGROUND
1	107.	125.	55.	63.	29.	3.	52.3
2	89.	39.	39.	86.	16.	3.	19.3
3	39.	31.	21.	47.	10.	3.	14.7
4	73.	60.	44.	47.	23.	3.	28.7
5	162.	73.	60.	50.	44.	13.	43.3
6	347.	70.	63.	47.	60.	39.	56.3
7	579.	86.	81.	50.	89.	86.	87.0
8	590.	86.	94.	57.	91.	89.	89.7
9	718.	79.	89.	57.	81.	84.	82.3
10	65.	538.	58.	47.	76.	81.	79.5
11	42.	243.	47.	37.	42.	32.	37.0
12	37.	214.	42.	34.	34.	34.	34.0
13	31.	170.	39.	29.	34.	34.	34.0
14	31.	34.	37.	29.	29.	170.	31.7
15	29.	37.	39.	23.	37.	94.	33.0
16	21.	21.	21.	18.	26.	97.	21.5
17	5.	5.	3.	5.	8.	13.	5.2
18	10.	8.	8.	13.	8.	8.	9.7
19	10.	3.	10.	10.	5.	8.	7.5
20	15.	8.	18.	13.	10.	13.	12.9
21	34.	13.	23.	16.	18.	18.	21.5
22	31.	50.	26.	44.	10.	37.	37.6
23	8.	39.	29.	21.	16.	42.	27.9
24	3.	23.	23.	13.	16.	21.	15.5

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY SOURCE DATA
76/10/28

HOUR ENDING	SO2 EMISSION (G/S)			EXIT VELOCITY (M/S)			STACK TEMPERATUE (DEG K)		
	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3
1	3322.	3305.	1737.	51.63	51.98	27.14	445.4	445.4	445.4
2	3248.	3262.	1722.	50.48	51.29	26.91	445.4	445.4	445.4
3	3226.	3262.	1728.	50.14	51.29	27.02	445.4	445.4	445.4
4	3263.	3283.	1700.	50.71	51.63	26.56	445.4	445.4	445.4
5	3270.	3269.	1692.	50.83	51.40	26.45	445.4	445.4	445.4
6	3285.	3291.	1902.	51.06	51.75	28.17	445.4	445.4	445.4
7	3278.	3327.	2293.	50.94	52.32	35.98	445.4	445.4	445.4
8	3263.	3313.	2608.	50.71	52.09	40.82	445.4	445.4	445.4
9	3270.	3379.	2931.	50.83	53.13	45.88	445.4	445.4	445.4
10	3268.	3357.	3011.	50.83	52.78	47.15	445.4	445.4	445.4
11	3351.	3327.	3165.	52.09	52.32	49.57	445.4	445.4	445.4
12	3381.	3349.	3246.	52.55	52.67	50.83	445.4	445.4	445.4
13	3389.	3357.	3268.	52.67	52.78	51.17	445.4	445.4	445.4
14	3352.	3349.	3304.	52.09	52.67	51.75	445.4	445.4	445.4
15	3367.	3342.	3377.	52.32	52.55	52.90	445.4	445.4	445.4
16	3374.	3335.	3370.	52.44	52.44	52.78	445.4	445.4	445.4
17	3367.	3313.	3333.	52.32	52.09	52.21	445.4	445.4	445.4
18	3250.	3298.	3355.	50.48	51.86	52.55	445.4	445.4	445.4
19	3323.	3313.	3385.	51.63	52.09	53.01	445.4	445.4	445.4
20	3301.	3327.	3399.	51.29	52.32	53.24	445.4	445.4	445.4
21	3331.	3342.	3349.	51.75	52.55	52.44	445.4	445.4	445.4
22	3316.	3306.	3377.	51.52	51.98	52.90	445.4	445.4	445.4
23	3309.	3313.	3407.	51.40	52.09	53.36	445.4	445.4	445.4
24	3294.	3327.	3407.	51.17	52.32	53.36	445.4	445.4	445.4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY METEOROLOGY
(CLIFTY CREEK SURFACE/DAYTON UPPER AIR)
76/10/28

HOUR ENDING	WIND DIR DEG	WIND SP M/S	TEMP DEG K	MIX HEIGHT METERS	STAB CLASS
1	53.	2.58	270.93	1457.65	7
2	59.	2.81	270.37	1452.45	7
3	61.	2.35	269.82	1447.24	7
4	72.	2.35	269.26	1442.04	7
5	78.	1.64	269.71	1436.83	7
6	72.	1.64	269.26	1431.63	7
7	59.	1.64	268.71	1426.43	7
8	70.	1.41	268.71	182.65	6
9	82.	1.17	271.48	383.88	5
10	92.	.78	274.82	585.10	4
11	16.	1.16	275.48	786.32	3
12	306.	1.50	277.04	987.55	2
13	297.	1.08	278.15	1188.77	1
14	207.	1.30	279.82	1390.00	2
15	246.	1.45	280.93	1390.00	3
16	237.	1.45	281.48	1390.00	3
17	243.	.78	280.93	1390.00	4
18	213.	.70	278.71	1381.83	5
19	190.	1.41	274.82	1359.74	6
20	199.	2.11	274.26	1337.65	6
21	207.	2.35	273.71	1315.56	6
22	203.	2.81	273.71	1293.47	6
23	204.	3.05	272.59	1271.37	5
24	206.	2.35	272.59	1249.28	6

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY MEASURED SO2 CONCENTRATIONS (UG/M**3)
76/10/28

HOUR ENDING	(1) BACON RIDGE	(2) RYKERS RIDGE	(3) NORTH MADISON	(4) HEBRON CHURCH	(5) LIBERTY RIDGE	(6) CANIP CREEK	CALCULATED BACKGROUND
1	5.	10.	5.	3.	138.	31.	32.8
2	5.	8.	10.	3.	29.	65.	19.7
3	3.	13.	15.	3.	21.	57.	18.3
4	21.	8.	18.	5.	39.	34.	20.3
5	18.	23.	21.	18.	55.	18.	25.5
6	5.	26.	29.	13.	50.	13.	22.7
7	3.	15.	39.	3.	42.	13.	19.3
8	3.	31.	29.	3.	29.	13.	18.0
9	3.	130.	73.	3.	115.	16.	56.7
10	91.	73.	57.	60.	170.	55.	84.3
11	50.	23.	37.	23.	68.	65.	39.6
12	32.	26.	57.	21.	545.	91.	133.5
13	29.	76.	68.	21.	1237.	94.	286.2
14	18.	540.	84.	21.	566.	1576.	1071.0
15	57.	958.	78.	26.	177.	692.	127.5
16	21.	418.	37.	26.	55.	162.	55.0
17	21.	371.	21.	23.	21.	65.	21.0
18	16.	144.	18.	23.	16.	47.	31.5
19	13.	37.	21.	21.	21.	55.	37.7
20	13.	31.	23.	18.	47.	37.	42.0
21	31.	39.	34.	23.	42.	34.	38.0
22	70.	57.	47.	44.	63.	44.	53.5
23	146.	89.	63.	81.	84.	55.	69.3
24	149.	89.	60.	63.	78.	60.	69.0

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY SOURCE DATA
76/11/25

HOUR ENDING	SO2 EMISSION (G/S) STACK 1	STACK 2	STACK 3	EXIT VELOCITY (M/S) STACK 1	STACK 2	STACK 3	STACK TEMPERATUE (DEG K) STACK 1	STACK 2	STACK 3
1	2978.	3182.	3374.	41.40	52.21	54.97	445.4	445.4	445.4
2	2708.	3199.	3409.	43.59	52.32	55.55	445.4	445.4	445.4
3	2925.	3150.	3381.	47.15	51.52	55.09	445.4	445.4	445.4
4	2973.	3185.	3367.	47.35	52.09	54.86	445.4	445.4	445.4
5	3119.	3145.	3346.	50.37	52.09	54.51	445.4	445.4	445.4
6	3153.	3164.	3367.	50.34	51.75	54.86	445.4	445.4	445.4
7	3146.	3171.	3381.	50.83	51.86	55.09	445.4	445.4	445.4
8	3146.	3192.	3360.	50.83	52.21	54.74	445.4	445.4	445.4
9	3118.	3185.	3325.	50.37	52.09	54.16	445.4	445.4	445.4
10	3139.	3171.	3339.	50.71	51.86	54.39	445.4	445.4	445.4
11	3133.	3178.	3339.	50.60	51.98	54.39	445.4	445.4	445.4
12	3140.	3171.	3325.	50.71	51.86	54.16	445.4	445.4	445.4
13	3147.	3178.	3318.	50.83	51.98	54.05	445.4	445.4	445.4
14	3133.	3164.	3296.	50.60	51.75	53.70	445.4	445.4	445.4
15	3126.	3157.	3325.	50.48	51.63	54.16	445.4	445.4	445.4
16	3117.	3171.	3339.	50.37	51.86	54.39	445.4	445.4	445.4
17	3112.	3171.	3339.	50.25	51.86	54.39	445.4	445.4	445.4
18	3119.	3143.	3339.	50.37	51.40	54.39	445.4	445.4	445.4
19	3105.	3129.	3339.	50.14	51.17	54.39	445.4	445.4	445.4
20	3076.	3143.	3339.	49.69	51.40	54.39	445.4	445.4	445.4
21	3112.	3143.	3353.	50.25	51.40	54.62	445.4	445.4	445.4
22	3105.	3136.	3303.	50.14	51.29	53.82	445.4	445.4	445.4
23	3126.	3122.	3323.	50.48	51.06	54.28	445.4	445.4	445.4
24	3105.	3129.	3339.	50.14	51.17	54.28	445.4	445.4	445.4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY METEOROLOGY
(CLIFTY CREEK SURFACE/DAYTON UPPER AIR)
76/11/25

HOUR ENDING	WIND DIR DEG	WIND SP M/S	TEMP DEG K	MIX HEIGHT METERS	STAB CLASS
1	178.	3.28	273.71	866.62	6
2	183.	3.52	273.71	866.96	5
3	186.	4.18	273.71	867.29	4
4	191.	3.75	274.26	867.63	5
5	191.	3.52	274.82	867.97	5
6	192.	3.52	274.82	868.30	5
7	193.	3.52	274.82	868.64	5
8	191.	3.66	274.82	50.50	4
9	190.	3.56	276.48	187.25	4
10	191.	3.32	278.15	324.00	4
11	198.	3.92	280.93	460.75	4
12	195.	3.40	283.15	597.50	4
13	189.	4.44	284.82	734.25	4
14	193.	5.49	285.48	871.00	4
15	194.	5.49	287.59	871.00	4
16	199.	5.75	287.59	871.00	4
17	190.	5.75	285.37	871.00	4
18	194.	4.96	283.71	852.39	4
19	195.	4.44	284.82	828.17	4
20	193.	4.96	285.37	803.95	4
21	193.	4.96	285.93	779.73	4
22	194.	5.22	285.93	755.51	4
23	193.	4.96	285.93	731.29	4
24	192.	5.22	285.93	707.07	4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY MEASURED SO2 CONCENTRATIONS (UG/M**3)
76/11/25

HOUR ENDING	(1) BACON RIDGE	(2) RYKERS RIDGE	(3) NORTH MADISON	(4) HEBRON CHURCH	(5) LIBERTY RIDGE	(6) CANIP CREEK	CALCULATED BACKGROUND
1	47.	52.	55.	10.	44.	10.	35.3
2	39.	44.	47.	16.	31.	8.	27.7
3	34.	31.	76.	253.	21.	10.	20.7
4	42.	39.	23.	117.	29.	10.	19.5
5	63.	57.	34.	37.	50.	13.	31.3
6	154.	63.	39.	42.	52.	13.	32.5
7	120.	63.	42.	42.	60.	13.	36.5
8	65.	65.	55.	60.	60.	13.	36.5
9	63.	70.	57.	180.	63.	16.	49.7
10	66.	70.	76.	329.	65.	37.	51.0
11	130.	86.	99.	290.	86.	58.	77.0
12	172.	81.	120.	553.	76.	52.	64.0
13	57.	57.	306.	587.	52.	42.	50.3
14	29.	26.	431.	65.	23.	21.	22.0
15	16.	18.	139.	232.	16.	18.	17.0
16	18.	23.	23.	175.	21.	23.	22.0
17	23.	26.	141.	190.	21.	23.	23.3
18	16.	18.	55.	138.	16.	16.	16.0
19	42.	52.	57.	151.	44.	29.	36.5
20	23.	29.	141.	342.	16.	16.	16.0
21	18.	23.	47.	217.	13.	16.	14.5
22	10.	18.	26.	355.	10.	16.	13.0
23	18.	21.	23.	328.	16.	16.	16.0
24	18.	21.	18.	347.	21.	21.	21.0

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY SOURCE DATA
76/12/27

HOUR ENDING	SO2 EMISSION (G/S)			EXIT VELOCITY (M/S)			STACK TEMPERATUE (DEG K)		
	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3	STACK 1	STACK 2	STACK 3
1	3285.	3270.	3370.	52.09	52.44	53.82	445.4	445.4	445.4
2	3279.	3299.	3370.	51.98	52.90	53.82	445.4	445.4	445.4
3	3283.	3306.	3370.	52.21	53.01	53.82	445.4	445.4	445.4
4	3279.	3313.	3377.	51.98	53.13	53.93	445.4	445.4	445.4
5	3151.	3328.	3362.	49.68	53.36	53.70	445.4	445.4	445.4
6	3272.	3306.	3370.	51.86	53.01	53.82	445.4	445.4	445.4
7	3271.	3320.	3370.	51.86	53.29	53.82	445.4	445.4	445.4
8	3272.	3328.	3363.	51.86	53.36	53.70	445.4	445.4	445.4
9	3316.	3355.	3355.	52.55	53.47	53.59	445.4	445.4	445.4
10	3308.	3313.	3348.	52.44	53.13	53.47	445.4	445.4	445.4
11	3228.	3306.	3341.	51.17	53.01	53.36	445.4	445.4	445.4
12	3250.	3313.	3334.	51.52	53.13	53.29	445.4	445.4	445.4
13	3279.	3292.	3326.	51.98	52.78	53.13	445.4	445.4	445.4
14	3265.	3270.	3305.	51.75	52.44	52.78	445.4	445.4	445.4
15	3257.	3277.	3298.	51.63	52.55	52.67	445.4	445.4	445.4
16	3254.	3263.	3312.	51.75	52.32	52.90	445.4	445.4	445.4
17	3257.	3285.	3312.	51.63	52.67	52.90	445.4	445.4	445.4
18	3199.	3285.	3305.	50.71	52.67	52.78	445.4	445.4	445.4
19	3215.	3263.	3319.	50.94	52.32	53.01	445.4	445.4	445.4
20	3222.	3270.	3291.	51.06	52.44	52.55	445.4	445.4	445.4
21	3251.	3270.	3276.	51.52	52.44	52.32	445.4	445.4	445.4
22	3256.	3263.	3247.	51.29	52.32	51.86	445.4	445.4	445.4
23	3222.	3263.	3254.	51.06	52.32	51.98	445.4	445.4	445.4
24	3222.	3285.	3254.	51.06	52.67	51.98	445.4	445.4	445.4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY METEOROLOGY
(CLIFTY CREEK SURFACE/DAYTON UPPER AIR)
76/12/27

HOUR ENDING	WIND DIR DEG	WIND SP M/S	TEMP DEG K	MIX HEIGHT METERS	STAB CLASS
1	332.	1.98	265.37	751.17	6
2	292.	1.41	264.26	775.70	6
3	287.	1.41	264.26	800.22	6
4	252.	.94	264.26	824.75	7
5	190.	.70	264.82	849.27	6
6	179.	.94	264.82	873.80	6
7	128.	.70	265.37	898.32	5
8	146.	2.35	265.93	922.85	4
9	158.	2.51	266.48	947.37	4
10	176.	3.92	267.59	971.90	4
11	184.	4.36	269.82	996.42	4
12	189.	4.70	273.15	1020.95	4
13	197.	4.44	274.26	1045.47	4
14	195.	3.92	275.37	1070.00	4
15	193.	4.18	276.48	1070.00	4
16	199.	4.70	278.15	1070.00	4
17	196.	4.70	279.82	1070.00	4
18	189.	4.70	279.82	1054.02	4
19	204.	5.49	280.93	1031.62	4
20	212.	4.44	281.48	1003.21	4
21	217.	3.92	282.04	986.91	4
22	224.	3.56	282.04	964.41	4
23	232.	4.18	283.15	942.01	4
24	235.	4.96	283.15	919.61	4

SELECTED MODEL EVALUATION INPUT DATA FOR CLIFTY CREEK POWER PLANT

HOURLY MEASURED SO2 CONCENTRATIONS (UG/M**3)
76/12/27

HOUR ENDING	(1) BACON RIDGE	(2) RYKERS RIDGE	(3) NORTH MADISON	(4) HEBRON CHURCH	(5) LIBERTY RIDGE	(6) CANIP CREEK	CALCULATED BACKGROUND
1	5.	31.	29.	19.	5.	31.	22.9
2	5.	26.	21.	21.	5.	23.	14.8
3	5.	19.	16.	21.	10.	19.	13.6
4	5.	16.	19.	19.	10.	19.	15.5
5	5.	26.	19.	19.	5.	19.	15.7
6	5.	21.	19.	16.	5.	19.	14.0
7	5.	15.	34.	16.	5.	16.	14.7
8	5.	13.	16.	13.	5.	16.	10.7
9	5.	10.	10.	10.	5.	13.	7.8
10	5.	10.	26.	8.	5.	13.	9.7
11	5.	13.	154.	5.	5.	16.	11.3
12	5.	19.	378.	201.	19.	23.	19.7
13	13.	42.	68.	457.	29.	42.	35.5
14	29.	70.	97.	806.	44.	65.	54.5
15	37.	68.	104.	754.	44.	58.	55.0
16	34.	76.	420.	183.	52.	73.	67.0
17	31.	55.	287.	243.	34.	55.	48.0
18	23.	39.	63.	568.	25.	42.	34.7
19	31.	55.	76.	60.	34.	44.	39.0
20	258.	102.	137.	129.	78.	86.	82.0
21	104.	136.	130.	97.	110.	133.	121.5
22	57.	120.	97.	63.	68.	107.	87.5
23	29.	125.	26.	19.	16.	60.	38.0
24	21.	93.	31.	25.	13.	29.	13.0

APPENDIX F

Statistics for Revised MPSDM Runs

Appendix F: Statistics for Revised MPSDM Runs

In this appendix, a second set of performance statistics is presented for the MPSDM model. This new set of statistics was generated after the model developer, Environmental Research and Technology, Inc. (ERT), expressed concerns about the manner in which MPSDM was originally exercised. The steering committee for the AMS/EPA cooperative agreement was in the process of conducting a peer scientific review for rural models, and after considering ERT's comments, recommended to EPA that MPSDM should be re-evaluated. The performance statistics presented here are for MPSDM re-run in accordance with the AMS instructions.

The primary concern of the model developer was the fact that they were not able to independently reproduce the concentration values predicted for the 1-hour time period corresponding to the highest value - a value provided to them by TRC. The developer suspected that incorrect input run streams associated with ambiguity in the MPSDM user's manual was the problem. Of particular concern were units used for wind speed and stack gas temperature.

The developer was also concerned with the manner in which wind speed data were input. TRC carried out the evaluation of MPSDM and the other models under study using an existing data base prepared by Teknekron Research, Inc. for the Clifty Creek power plant in Indiana. The wind speed data in the Teknekron data base consisted of "effective" 7 m data, calculated by adjusting wind speeds measured at 60 m on-tower to a 7 m height using the CRSTER rural wind profile. The effective 7 m data were subsequently input to the models and extrapolated to stack-height using each model's respective wind profile coefficients (See Table 3, page 22). The wind speeds at stack height calculated by MPSDM using the "effective" 7 m data are different from the wind speeds MPSDM would calculate from the

measured 60 m wind speeds because MPSDM employs wind profile coefficients different from the CRSTER profile. (All the other models under study employ the CRSTER wind profile coefficients.)

In the re-run of MPSDM, the corrections to the input data streams were made and a new set of wind profile coefficients was used that first restores the effective 7 m wind speeds to the values actually observed at 60 m on-tower, then extrapolates the measured 60 m wind speeds to stack height according to the wind-profile coefficients of the MPSDM model. In addition, a new MPSDM code (Version 2.20) was utilized for the second run. Version 2.20 was not originally available in time for computer implementation and check-out. Besides the different wind profile coefficients, Version 2.20, as run, differs from the original version in that Version 2.20 employs six stability classes (4 nonstable, 2 stable classes) while the original version used five classes (4 nonstable, 1 stable class).

The readers should be aware, therefore, that differences in the performance statistics for the two versions of MPSDM are associated with the following:

(1) Units used for wind speed;

(2) Units used for stack gas temperature;

(3) Alterations to the wind speed profiles;

(4) Used of six vs. five stability classes.

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	790.8	1862.2	-1071.5(-1250.8, -892.2)	-1019.0(-1179.0, -887.2)	0.40(0.20, 0.79)	0.96 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	508.9	748.2	-239.3(-327.2, -151.5)	-205.9(-270.3, -144.7)	0.23(0.12, 0.46)	0.68 (.385)
STATION 2	535.0	1076.4	-541.4(-685.1, -397.6)	-431.6(-581.3, -340.6)	0.10(0.05, 0.21)	0.96 (.385)
STATION 3	580.1	1489.4	-909.4(-1061.6, -757.1)	-950.4(-1037.7, -780.0)	0.92(0.46, 1.82)	0.96 (.385)
STATION 4	550.0	839.9	-289.9(-416.4, -163.4)	-189.9(-314.0, -136.2)	0.21(0.10, 0.41)	0.64 (.385)
STATION 5	225.9	1359.5	-1133.6(-1419.8, -847.5)	-928.9(-1351.1, -720.1)	0.01(0.01, 0.03)	1.00 (.385)
STATION 6	512.6	798.2	-285.6(-408.2, -163.1)	-307.9(-413.7, -197.7)	1.38(0.70, 2.74)	0.72 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	652.5	1862.2	-1209.7(-1380.3,-1039.2)	-1142.8(-1304.4,-1009.1)	0.25(0.13, 0.50)	1.00 (.385)
2.5 TO 5 M/SEC	652.0	858.0	-206.0(-325.7, -86.2)	-212.9(-273.4, -158.0)	1.71(0.86, 3.39)	0.80 (.385)
>5 M/SEC	489.9	274.6	215.3(158.6, 272.1)	160.6(135.6, 248.8)	5.85(2.95, 11.60)	-0.92 (.385)
B. STABILITY GROUP						
CLASS A & B	481.3	1455.1	-973.8(-1152.6, -795.0)	-946.4(-1066.4, -733.9)	0.08(0.04, 0.16)	1.00 (.385)
CLASS C	678.9	1361.0	-682.1(-898.8, -465.4)	-699.4(-765.1, -452.9)	0.27(0.14, 0.53)	0.92 (.385)
CLASS D	586.6	1442.8	-856.2(-997.7, -714.7)	-890.7(-983.5, -670.0)	0.06(0.03, 0.11)	1.00 (.385)
CLASS E & F	398.0	99.2	298.8(196.5, 401.0)	212.2(167.9, 274.0)	227.99(114.92,452.28)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-9A)	476.3	810.8	-334.5(-422.4, -246.6)	-275.3(-357.8, -233.7)	0.28(0.14, 0.56)	0.92 (.385)
2. BY STATION/ALL EVENTS (A-9B)						
STATION 1	322.6	329.6	-7.1(-50.3, 36.2)	-27.1(-58.2, 33.6)	0.94(0.47, 1.86)	0.24 (.385)
STATION 2	286.6	445.7	-159.0(-227.3, -90.8)	-151.7(-221.3, -70.9)	0.33(0.17, 0.65)	0.64 (.385)
STATION 3	315.9	677.2	-361.3(-464.9, -257.7)	-380.0(-410.3, -259.5)	0.48(0.24, 0.96)	0.88 (.385)
STATION 4	313.3	344.4	-31.1(-84.4, 22.1)	-3.4(-73.5, 15.5)	0.96(0.48, 1.90)	0.32 (.385)
STATION 5	125.6	505.1	-379.5(-496.2, -262.8)	-275.4(-448.2, -204.1)	0.03(0.01, 0.05)	0.92 (.385)
STATION 6	257.9	311.2	-53.3(-122.3, 15.8)	-90.4(-109.2, -19.9)	1.08(0.54, 2.14)	0.44 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	316.2	786.0	-469.8(-561.3, -378.2)	-424.9(-476.6, -367.1)	0.24(0.12, 0.49)	0.96 (.385)
2.5 TO 5 M/SEC	410.5	533.2	-122.7(-188.8, -56.5)	-100.9(-164.9, -62.3)	0.71(0.36, 1.41)	0.60 (.385)
>5 M/SEC	308.1	164.4	143.8(92.4, 195.2)	81.5(78.9, 153.0)	6.58(3.32, 13.06)	-0.84 (.385)
B. STABILITY GROUP						
CLASS A & B	228.3	550.8	-322.5(-409.4, -235.5)	-287.7(-368.2, -245.6)	0.55(0.28, 1.09)	0.88 (.385)
CLASS C	359.0	611.9	-252.9(-367.0, -138.9)	-205.6(-285.8, -119.4)	0.22(0.11, 0.44)	0.76 (.385)
CLASS D	385.5	581.7	-196.1(-273.5, -118.8)	-158.3(-252.3, -104.2)	0.26(0.13, 0.52)	0.72 (.385)
CLASS E & F	196.9	148.0	48.9(-42.2, 140.0)	94.5(57.3, 116.7)	0.36(0.18, 0.71)	-0.76 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 24 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	126.7	164.3	-37.6(-63.0, -12.1)	-29.9(-47.6, -15.0)	0.37(0.19, 0.74)	0.48 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	97.4	60.6	36.7(21.2, 52.3)	34.8(22.3, 44.7)	2.63(1.33, 5.23)	-0.68 (.385)
STATION 2	65.4	77.1	-11.7(-29.6, 6.2)	-13.1(-23.3, 5.4)	0.69(0.35, 1.37)	0.44 (.385)
STATION 3	78.1	132.9	-54.8(-83.0, -26.6)	-52.9(-72.6, -27.9)	0.45(0.23, 0.89)	0.60 (.385)
STATION 4	84.5	72.1	12.3(2.0, 22.6)	16.5(2.6, 24.4)	1.15(0.58, 2.28)	-0.40 (.385)
STATION 5	34.9	77.4	-42.4(-62.0, -22.9)	-34.3(-59.2, -10.1)	0.05(0.02, 0.09)	0.52 (.385)
STATION 6	57.5	59.4	-1.9(-27.3, 23.5)	-0.0(-8.2, 11.7)	0.30(0.15, 0.59)	-0.24 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 1 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	771.8	1830.0	-1058.2(-1225.7, -890.7)	-854.6(-1156.5, -816.8)	0.05(0.02, 0.09)	1.00 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	581.7	730.3	-148.6(-248.1, -49.1)	-68.7(-182.3, -27.7)	0.21(0.10, 0.41)	0.36 (.385)
STATION 2	658.9	866.4	-207.5(-327.4, -87.6)	-140.5(-257.2, -66.5)	0.31(0.16, 0.61)	0.44 (.385)
STATION 3	450.3	1365.2	-914.9(-1085.3, -744.5)	-925.9(-1125.0, -633.7)	0.07(0.03, 0.13)	1.00 (.385)
STATION 4	546.7	875.3	-328.6(-432.2, -225.0)	-260.5(-374.5, -208.8)	0.15(0.08, 0.31)	0.88 (.385)
STATION 5	321.3	1246.5	-925.2(-1229.2, -621.2)	-784.6(-1047.6, -495.8)	0.05(0.03, 0.10)	0.92 (.385)
STATION 6	496.8	859.2	-362.4(-490.0, -234.8)	-307.0(-392.6, -193.4)	0.11(0.05, 0.21)	0.76 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	669.0	1830.0	-1161.0(-1332.9, -989.1)	-962.6(-1246.3, -923.8)	0.11(0.06, 0.22)	1.00 (.385)
2.5 TO 5 M/SEC	667.5	788.9	-121.4(-190.6, -52.2)	-94.6(-153.8, -58.2)	0.57(0.29, 1.12)	0.52 (.385)
>5 M/SEC	458.5	360.2	98.3(10.4, 186.2)	122.0(82.2, 146.8)	0.45(0.22, 0.88)	-0.80 (.385)
B. STABILITY GROUP						
CLASS A & B	541.4	1341.3	-799.9(-1020.2, -579.6)	-558.7(-917.5, -498.9)	0.07(0.04, 0.14)	0.96 (.385)
CLASS C	631.4	1449.5	-818.1(-1016.4, -619.8)	-690.6(-928.6, -562.4)	0.10(0.05, 0.20)	0.96 (.385)
CLASS D	672.4	1138.4	-466.0(-604.8, -327.2)	-469.9(-558.4, -278.4)	0.08(0.04, 0.16)	0.76 (.385)
CLASS E & F	343.5	124.7	218.8(179.5, 258.1)	175.6(166.9, 227.6)	35.02(17.65, 69.48)	-1.00 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED
SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 3 HOURS

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)	DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)	VARIANCE COMPARISON (OBS/PRED)	FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	480.9	831.4	-350.5(-450.3, -250.7)	-306.4(-405.7, -205.2)	0.11(0.05, 0.21)	0.92 (.385)
2. BY STATION/ALL EVENTS (A-4B)						
STATION 1	372.7	304.3	68.4(22.4, 114.4)	87.6(12.7, 114.3)	0.62(0.31, 1.23)	-0.52 (.385)
STATION 2	373.6	363.2	10.4(-58.5, 79.3)	52.3(-22.8, 83.3)	0.41(0.21, 0.82)	-0.28 (.385)
STATION 3	252.8	673.9	-421.1(-544.8, -297.4)	-331.3(-415.8, -268.5)	0.08(0.04, 0.15)	0.92 (.385)
STATION 4	360.2	405.8	-45.6(-133.8, 42.6)	-43.9(-63.6, 35.7)	0.29(0.15, 0.58)	0.20 (.385)
STATION 5	177.1	485.6	-308.5(-425.8, -191.2)	-277.0(-366.4, -148.7)	0.11(0.05, 0.21)	0.68 (.385)
STATION 6	287.8	338.9	-51.1(-96.8, -5.4)	-37.0(-85.4, 1.8)	0.28(0.14, 0.55)	0.36 (.385)
3. BY METEOROLOGICAL CONDITION (A-5)						
A. WIND SPEED						
<2.5 M/SEC	338.6	791.3	-452.7(-561.3, -344.1)	-389.0(-513.8, -292.3)	0.09(0.04, 0.17)	0.96 (.385)
2.5 TO 5 M/SEC	445.5	493.0	-47.5(-114.6, 19.6)	-34.1(-62.5, 13.6)	0.29(0.14, 0.57)	0.24 (.385)
>5 M/SEC	316.0	187.3	128.7(81.3, 176.1)	109.3(81.6, 143.8)	2.98(1.50, 5.92)	-0.72 (.385)
B. STABILITY GROUP						
CLASS A & B	263.8	629.1	-365.3(-493.0, -237.6)	-281.0(-414.0, -181.4)	0.08(0.04, 0.16)	0.72 (.385)
CLASS C	364.3	578.4	-214.1(-298.2, -130.0)	-153.9(-246.4, -122.2)	0.27(0.14, 0.53)	0.84 (.385)
CLASS D	443.1	488.7	-45.6(-132.5, 41.3)	-20.0(-72.3, 53.6)	0.14(0.07, 0.27)	-0.24 (.385)
CLASS E & F	217.9	91.0	126.9(82.7, 171.1)	132.7(95.1, 154.0)	1.38(0.70, 2.74)	-0.84 (.385)

TABLE A. COMPARISON OF 25 HIGHEST OBSERVED AND PREDICTED SO2 CONCENTRATION VALUES (UNPAIRED IN TIME OR LOCATION)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 24 HOUR

DATA SETS	AVERAGE OBSERVED VALUE (UG/M**3)	AVERAGE PREDICTED VALUE (UG/M**3)	DIFFERENCE OF AVERAGES (OBS-PRED) (UG/M**3)			DIFFERENCE OF MEDIANS (OBS-PRED) (UG/M**3)			VARIANCE COMPARISON (OBS/PRED)			FREQUENCY DISTRIBUTION COMPARISON (FOBS-FPRED) (FRACTION)
1. ALL STATIONS/ALL EVENTS (A-4A)	125.3	139.5	-14.2(	-28.2,	-0.2)	-19.0(	-24.6,	1.6)	0.45(	0.23,	0.90)	0.28 (.385)
2. BY STATION/ALL EVENTS (A-4B)												
STATION 1	96.4	67.0	29.4(	16.5,	42.3)	29.9(	15.7,	43.9)	0.55(	0.28,	1.09)	-0.64 (.385)
STATION 2	84.8	63.2	21.6(	10.4,	32.8)	27.1(	11.5,	32.8)	0.79(	0.40,	1.57)	-0.64 (.385)
STATION 3	64.3	113.0	-48.7(	-69.1,	-28.3)	-34.3(	-62.9,	-26.4)	0.34(	0.17,	0.67)	0.76 (.385)
STATION 4	107.7	80.4	27.3(	11.5,	43.1)	31.7(	13.8,	42.6)	0.98(	0.49,	1.94)	-0.64 (.385)
STATION 5	40.1	72.6	-32.5(	-50.0,	-15.0)	-29.6(	-45.8,	-9.3)	0.23(	0.12,	0.45)	0.48 (.385)
STATION 6	71.8	56.6	15.2(	1.9,	28.5)	16.6(	6.2,	28.4)	0.53(	0.27,	1.05)	-0.44 (.385)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3768	109.5	115.3	-5.8 (±9.3)	0.22 (0.20, 0.24)	-0.47 (.031)
2. All concentrations, all stations (paired in time and location) (B-3)	5892	88.2	82.4	5.8 (±6.3)	0.24 (0.22, 0.26)	-0.53 (.025)
3. All concentrations, by station (B-1)						
Station 1	1374	94.2	53.7	40.5 (±9.0)	0.63 (0.57, 0.71)	-0.59 (.052)
Station 2	886	96.0	91.8	4.2 (±16.9)	0.27 (0.24, 0.30)	-0.49 (.065)
Station 3	1139	84.4	119.7	-35.3 (±18.7)	0.15 (0.13, 0.16)	-0.52 (.057)
Station 4	1028	96.9	92.0	4.9 (±12.7)	0.47 (0.42, 0.52)	-0.30 (.060)
Station 5	742	56.1	69.7	-13.6 (±21.3)	0.03 (0.03, 0.03)	-0.79 (.071)
Station 6	723	93.8	65.8	28.0 (±15.9)	0.46 (0.40, 0.52)	-0.61 (.072)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	2580	78.3	122.9	-44.6 (±12.4)	0.12 (0.11, 0.14)	-0.49 (.038)
2.5 to 5 m/sec	2851	90.3	51.4	38.9 (±6.1)	0.67 (0.61, 0.73)	-0.59 (.036)
>5 m/sec	461	130.9	47.1	83.8 (±14.6)	3.04 (2.60, 3.56)	-0.49 (.090)
b. Stability Group						
Class A & B	601	96.0	224.6	-128.6 (±31.9)	0.10 (0.09, 0.12)	-0.33 (.078)
Class C	1036	105.1	158.8	-53.7 (±19.4)	0.24 (0.21, 0.27)	-0.36 (.060)
Class D	3133	91.5	56.4	35.2 (±7.1)	0.34 (0.31, 0.38)	-0.53 (.034)
Class E & F	1122	59.3	8.4	50.9 (±5.0)	14.42 (12.89,16.13)	-0.78 (.057)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	3768	-5.8 (±14.2)	0.72	81612 (78058, 85438)	81623	154.9	0.06 (0.03, 0.09)	-0.24 (.031)
2. All concentrations, all stations (paired in time and location) (B-3)	5892	5.8 (±9.2)	0.75	63224 (61006, 65576)	63247	135.7	-0.03 (-0.05, -0.00)	-0.26 (.025)
3. All concentrations, by station (B-1)								
Station 1	1374	40.5 (±14.1)	0.78	31549 (29325, 34061)	33166	122.0	-0.08 (-0.13, -0.03)	-0.23 (.052)
Station 2	886	4.2 (±23.2)	0.74	67826 (61955, 74661)	67768	148.0	-0.04 (-0.10, 0.03)	-0.25 (.065)
Station 3	1139	-35.3 (±29.1)	0.73	103126 (95187, 112203)	104283	162.9	0.00 (-0.05, 0.06)	-0.22 (.057)
Station 4	1028	4.9 (±17.1)	0.64	43800 (40263, 47874)	43782	132.3	-0.01 (-0.08, 0.05)	-0.15 (.060)
Station 5	742	-13.6 (±26.4)	0.87	88555 (80234, 98381)	88620	111.8	-0.02 (-0.09, 0.05)	-0.41 (.071)
Station 6	723	28.0 (±25.7)	0.80	51152 (46288, 56909)	51866	133.2	-0.08 (-0.16, -0.01)	-0.26 (.072)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	2580	-44.6 (±18.4)	0.70	10611^8 (100640, 112252)	108134	169.3	-0.05 (-0.09, -0.02)	-0.27 (.038)
2.5 to 5 m/sec	2851	38.9 (±8.2)	0.80	25976 (24682, 27384)	27478	105.6	0.06 (0.03, 0.10)	-0.22 (.036)
>5 m/sec	461	83.8 (±24.2)	0.78	26290 (23219, 30083)	33247	133.9	-0.03 (-0.12, 0.06)	-0.12 (.090)
b. Stability Group								
Class A & B	601	-128.6 (±44.5)	0.57	157656 (141334, 177290)	173920	242.2	0.02 (-0.06, 0.10)	-0.21 (.078)
Class C	1036	-53.7 (±25.4)	0.61	107682 (99017, 117655)	110644	200.6	-0.08 (-0.14, -0.02)	-0.19 (.060)
Class D	3133	35.2 (±11.0)	0.79	44090 (41991, 46365)	45312	120.3	-0.10 (-0.13, -0.06)	-0.24 (.034)
Class E & F	1122	50.9 (±7.2)	0.89	7695 (7098, 8378)	10283	61.8	-0.11 (-0.17, -0.05)	-0.24 (.057)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1353	89.4	91.5	-2.0 ($\pm$9.8)	0.32 (0.29, 0.36)	-0.38 (.052)
2. All concentrations, all stations (paired in time and location) (B-3)	2293	71.7	68.8	2.9 ($\pm$6.4)	0.34 (0.31, 0.38)	-0.41 (.040)
3. All concentrations, by station (B-1)						
Station 1	1064	78.6	45.3	33.3 ($\pm$6.9)	0.92 (0.82, 1.02)	-0.47 (.059)
Station 2	734	73.5	72.5	1.0 ($\pm$11.1)	0.40 (0.35, 0.46)	-0.36 (.071)
Station 3	880	69.5	101.6	-32.1 ($\pm$13.7)	0.19 (0.17, 0.22)	-0.43 (.065)
Station 4	822	76.6	72.4	4.1 ($\pm$8.7)	0.77 (0.68, 0.88)	-0.16 (.067)
Station 5	532	46.3	64.2	-18.0 ($\pm$15.3)	0.04 (0.04, 0.05)	-0.66 (.083)
Station 6	554	76.3	55.8	20.6 ($\pm$11.6)	0.57 (0.50, 0.66)	-0.55 (.082)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	1434	62.1	108.1	-46.1 ($\pm$10.5)	0.16 (0.14, 0.18)	-0.31 (.051)
2.5 to 5 m/sec	2608	71.7	54.0	17.8 ($\pm$4.9)	0.53 (0.48, 0.59)	-0.48 (.038)
>5 m/sec	544	96.8	36.3	60.5 ($\pm$9.2)	3.43 (2.98, 3.94)	-0.49 (.082)
b. Stability Group						
Class A & B	430	72.2	156.5	-84.3 ($\pm$19.8)	0.21 (0.18, 0.25)	0.32 (.093)
Class C	878	84.6	123.0	-38.4 ($\pm$13.3)	0.29 (0.25, 0.33)	-0.25 (.065)
Class D	2652	72.1	50.7	21.4 ($\pm$4.9)	0.50 (0.45, 0.55)	-0.43 (.037)
Class E & F	716	53.9	14.5	39.4 ($\pm$6.4)	0.94 (0.82, 1.07)	-0.73 (.072)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Gross Variability ($\mu g/m^3)^2$	Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1353	-2.0 (±11.3)	0.69	31332 (29108, 33848)	31313	110.0	0.09 (0.03, 0.14)	-0.20 (.052)
2. All concentrations, all stations (paired in time and location) (B-3)	2293	2.9 (±6.7)	0.69	25134 (23745, 26661)	25131	99.9	-0.03 (-0.07, 0.01)	-0.19 (.040)
3. All concentrations, by station (B-1)								
Station 1	532	33.3 (±13.1)	0.73	14373 (12800, 16288)	15455	90.9	-0.08 (-0.17, 0.00)	-0.15 (.083)
Station 2	357	1.0 (±20.1)	0.70	24089 (20932, 28102)	24024	101.4	-0.02 (-0.12, 0.08)	-0.19 (.102)
Station 3	440	-32.1 (±28.1)	0.68	43550 (38355, 49999)	44482	125.2	-0.02 (-0.12, 0.07)	-0.25 (.092)
Station 4	411	4.2 (±14.2)	0.56	15098 (13241, 17421)	15079	88.8	0.07 (-0.03, 0.16)	-0.10 (.095)
Station 5	266	-18.0 (±24.5)	0.78	33428 (28438, 40022)	33625	91.6	-0.09 (-0.21, 0.03)	-0.35 (.118)
Station 6	277	20.5 (±28.9)	0.75	20857 (17798, 24876)	21205	99.6	-0.08 (-0.20, 0.04)	-0.23 (.116)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	717	-46.1 (±19.9)	0.59	43422 (39277, 48331)	45484	131.3	-0.08 (-0.16, -0.01)	-0.20 (.072)
2.5 to 5 m/sec	1304	17.8 (±9.2)	0.73	15944 (14792, 17250)	16247	85.4	0.04 (-0.02, 0.09)	-0.19 (.053)
>5 m/sec	272	60.5 (±15.1)	0.78	10488 (8938, 12530)	14072	86.6	0.15 (0.03, 0.26)	0.12 (.117)
b. Stability Group								
Class A & B	215	-84.3 (±32.8)	0.47	44324 (37063, 54227)	51218	153.6	-0.01 (-0.14, 0.12)	-0.14 (.131)
Class C	439	-38.4 (±22.5)	0.55	41071 (36166, 47161)	42451	133.7	-0.01 (-0.10, 0.08)	-0.14 (.092)
Class D	1281	21.4 (±10.7)	0.72	18608 (17252, 20146)	19053	90.3	-0.12 (-0.17, -0.06)	-0.18 (.054)
Class E & F	358	39.4 (±12.6)	0.88	8450 (7344, 9856)	9977	60.9	-0.10 (-0.20, 0.00)	-0.26 (.102)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $C_o - C_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $\|f(C_o) - f(C_p)\|$ max (fraction)
1. Highest concentration, event-by-event (A-1)	337	38.3	37.0	1.3 (±6.2)	0.49 (0.40, 0.60)	-0.32 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1152	21.9	17.4	4.5 (±2.3)	0.59 (0.53, 0.66)	-0.47 (.057)
3. All concentrations, by station (B-1)						
Station 1	211	29.0	14.6	14.4 (±5.1)	2.26 (1.79, 2.84)	-0.39 (.132)
Station 2	192	20.7	17.4	3.3 (±5.1)	0.62 (0.49, 0.78)	-0.42 (.139)
Station 3	202	23.5	27.8	-4.3 (±7.6)	0.30 (0.24, 0.38)	-0.48 (.135)
Station 4	187	24.7	20.8	3.9 (±5.4)	1.18 (0.92, 1.50)	-0.30 (.141)
Station 5	216	13.2	10.1	3.1 (±4.1)	0.11 (0.09, 0.14)	-0.78 (.131)
Station 6	144	20.6	13.8	6.8 (±6.3)	0.51 (0.39, 0.68)	-0.48 (.160)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1975) MODEL: MPSDM AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3)^2$	Characteristic Discrepancies: Gross Variability ($\mu g/m^3)^2$	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test [f(d) - t_n!] max (fraction)
1. Highest concentration, event-by-event (A-1)	337	1.3 (±6.1)	0.63	2596 (2247, 3043)	2590	34.6	0.26 (0.15, 0.35)	-0.12 (.105)
2. All concentrations, all stations (paired in time and location) (B-3)	1152	4.5 (±2.5)	0.72	1296 (1197, 1409)	1315	22.8	0.22 (0.17, 0.28)	-0.18 (.057)
3. All concentrations, by station (B-1)								
Station 1	211	14.4 (±6.3)	0.73	1208 (1009, 1481)	1410	25.5	0.16 (0.02, 0.28)	0.14 (.132)
Station 2	192	3.3 (±5.6)	0.70	1021 (845, 1265)	1027	21.6	0.22 (0.08, 0.35)	-0.18 (.139)
Station 3	202	-4.3 (±7.7)	0.69	2316 (1926, 2853)	2323	30.0	0.28 (0.15, 0.40)	-0.23 (.135)
Station 4	187	3.9 (±4.1)	0.63	694 (573, 862)	705	18.1	0.51 (0.39, 0.61)	0.14 (.141)
Station 5	216	3.1 (±4.4)	0.85	910 (761, 1113)	915	18.1	0.06 (-0.07, 0.19)	-0.37 (.131)
Station 6	144	6.8 (±7.9)	0.72	1502 (1210, 1929)	1538	23.5	-0.01 (-0.17, 0.16)	-0.17 (.160)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $\lvert f(C_o) - f(C_p) \rvert$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4308	122.6	96.8	25.8 (±7.9)	0.31 (0.28, 0.34)	-0.51 (.029)
2. All concentrations, all stations (paired in time and location) (B-3)	6788	95.5	69.2	26.3 (±5.4)	0.34 (0.31, 0.37)	-0.55 (.023)
3. All concentrations, by station (B-1)						
Station 1	1519	99.8	51.0	48.8 (±8.8)	0.91 (0.82, 1.01)	-0.60 (.049)
Station 2	1263	98.2	50.7	47.5 (±11.0)	0.68 (0.61, 0.76)	-0.66 (.054)
Station 3	1166	82.2	103.3	21.1 (±16.3)	0.12 (0.11, 0.14)	-0.51 (.056)
Station 4	1363	100.3	80.5	19.8 (±10.6)	0.56 (0.51, 0.63)	-0.34 (.052)
Station 5	554	69.1	89.0	19.9 (±27.2)	0.07 (0.06, 0.08)	-0.68 (.082)
Station 6	923	110.3	52.9	57.4 (±13.3)	0.39 (0.34, 0.44)	-0.74 (.063)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	2459	82.4	111.4	-29.0 (±12.0)	0.15 (0.14, 0.17)	-0.52 (.039)
2.5 to 5 m/sec	3884	100.5	43.7	56.8 (±5.0)	1.03 (0.94, 1.13)	-0.61 (.031)
>5 m/sec	445	124.4	58.7	65.7 (±15.6)	1.20 (1.02, 1.42)	-0.48 (.091)
b. Stability Group						
Class A & B	588	105.1	197.5	-92.4 (±30.8)	0.14 (0.13, 0.17)	-0.32 (.079)
Class C	1292	106.1	147.6	-41.5 (±16.8)	0.22 (0.20, 0.24)	-0.39 (.054)
Class D	3654	103.1	41.7	61.4 (±5.6)	0.82 (0.74, 0.90)	-0.60 (.032)
Class E & F	3982	58.0	8.4	49.6 (±2.1)	6.88 (6.25, 7.57)	-0.79 (.030)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 1 HOUR

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - i_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	4308	25.8 (±11.4)	0.75	67215 (64471, 70155)	67866	150.8	0.06 (0.03, 0.09)	-0.22 (.029)
2. All concentrations, all stations (paired in time and location) (B-3)	6788	26.3 (±7.9)	0.77	54615 (52827, 56504)	55299	135.7	-0.08 (-0.10, -0.05)	-0.24 (.023)
3. All concentrations, by station (B-1)								
Station 1	1519	48.8 (±14.6)	0.78	33996 (31711, 36563)	36354	127.4	-0.11 (-0.16, -0.06)	-0.22 (.049)
Station 2	1263	47.6 (±14.9)	0.82	41784 (38720, 45264)	44012	124.9	-0.05 (-0.10, 0.01)	-0.26 (.054)
Station 3	1166	-21.1 (±24.5)	0.72	85086 (78608, 92482)	85459	152.4	-0.08 (-0.14, -0.02)	-0.27 (.056)
Station 4	1363	19.8 (±17.1)	0.65	45068 (41879, 48672)	45428	138.3	-0.13 (-0.18, -0.08)	-0.14 (.052)
Station 5	554	-19.9 (±31.9)	0.81	108789 (97099, 122960)	108988	143.5	-0.05 (-0.13, 0.04)	-0.36 (.082)
Station 6	923	57.4 (±18.8)	0.87	42928 (39282, 47159)	46171	134.4	-0.02 (-0.08, 0.05)	-0.29 (.063)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	2549	-29.0 (±16.4)	0.69	98235 (93073, 103881)	99036	166.9	-0.09 (-0.13, -0.05)	-0.27 (.038)
2.5 to 5 m/sec	3884	56.8 (±7.8)	0.80	26881 (25727, 28122)	30100	116.7	-0.04 (-0.07, -0.01)	-0.20 (.031)
>5 m/sec	445	65.7 (±23.5)	0.75	29300 (25822, 33611)	33556	129.3	-0.04 (-0.14, 0.05)	-0.11 (.091)
b. Stability Group								
Class A & B	588	-92.4 (±42.9)	0.60	155315 (139074, 174892)	163595	246.0	-0.11 (-0.19, -0.03)	-0.21 (.079)
Class C	1292	-41.5 (±22.3)	0.63	102847 (95385, 111310)	104492	198.3	-0.11 (-0.17, -0.06)	-0.20 (.054)
Class D	3654	61.4 (±9.0)	0.81	33057 (31596, 34632)	36818	121.0	-0.13 (-0.16, -0.09)	-0.20 (.032)
Class E & F	1254	49.6 (±5.7)	0.88	5232 (4847, 5669)	7685	62.4	-0.22 (-0.27, -0.17)	-0.23 (.054)

TABLE B. (PART 1) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons		
				Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o^2/S_p^2	Frequency Distribution Comparison $\lvert f(C_o) - f(C_p) \rvert$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1563	100.2	77.0	23.2 (±8.6)	0.44 (0.39, 0.48)	-0.43 (.049)
2. All concentrations, all stations (paired in time and location) (B-3)	2661	77.8	57.5	20.2 (±5.6)	0.47 (0.43, 0.52)	-0.44 (.037)
3. All concentrations, by station (B-3)						
Station 1	602	81.2	41.8	39.4 (±9.5)	1.41 (1.22, 1.62)	-0.50 (.078)
Station 2	501	80.1	41.8	38.3 (±11.4)	0.92 (0.80, 1.06)	-0,54 (.086)
Station 3	455	67.0	87.2	-20.2 (±17.6)	0.13 (0.11, 0.15)	-0.42 (.090)
Station 4	527	82.5	66.4	16.1 (±11.9)	0.79 (0.69, 0.91)	-0.24 (.084)
Station 5	211	54.9	77.2	-22.4 (±26.0)	0.11 (0.09, 0.14)	-0.52 (.132)
Station 6	365	88.8	43.9	44.8 (±12.9)	0.61 (0.50, 0.74)	-0.66 (.101)
4. By meteorological conditions, all stations (B-4)						
a. Wind Speed						
<2.5 m/sec	723	63.4	100.8	-37.4 (±14.6)	0.18 (0.16, 0.20)	-0.33 (.072)
2.5 to 5 m/sec	1550	80.6	42.7	37.9 (±6.1)	0.92 (0.83, 1.03)	-0.51 (.049)
>5 m/sec	388	93.2	36.2	57.0 (±10.2)	2.38 (1.97, 2.87)	-0.52 (.098)
b. Stability Group						
Class A & B	228	82.7	144.5	-61.7 (±32.2)	0.15 (0.12, 0.19)	-0.27 (.127)
Class C	503	82.8	104.2	-21.4 (±43.6)	0.35 (0.31, 0.40)	-0.29 (.086)
Class D	1481	83.0	43.1	40.0 (±6.2)	1.00 (0.89, 1.11)	-0.46 (.050)
Class E & F	449	52.3	9.0	43.3 (±5.5)	3.48 (2.96, 4.10)	-0.75 (.091)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 3 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	1563	23.2 (±10.6)	0.73	26710 (24939, 28696)	27233	106.3	0.12 (0.07, 0.17)	-0.19 (.049)
2. All concentrations, all stations (paired in time and location) (B-3)	2661	20.2 (±7.5)	0.72	23108 (21918, 22407)	23509	99.8	-0.06 (-0.09, -0.02)	-0.19 (.037)
3. All concentrations, by station (B-1)								
Station 1	602	39.4 (±13.7)	0.73	16280 (14596, 18306)	17805	94.4	-0.14 (-0.22, -0.06)	-0.16 (.078)
Station 2	501	38.3 (±12.4)	0.77	16185 (14364, 18414)	17617	90.8	0.04 (-0.05, 0.13)	-0.19 (.086)
Station 3	455	-20.2 (±25.3)	0.66	39223 (34614, 44923)	39546	115.9	-0.11 (-0.20, -0.02)	-0.22 (.090)
Station 4	527	16.1 (±15.6)	0.61	21180 (18852, 24016)	21399	98.7	-0.09 (-0.17, -0.00)	-0.11 (.084)
Station 5	211	-22.4 (±28.3)	0.72	36028 (30078, 44167)	36357	106.7	0.04 (-0.09, 0.18)	-0.30 (.132)
Station 6	365	44.8 (±15.5)	0.84	14659 (12757, 17071)	16629	95.2	0.07 (-0.03, 0.17)	-0.25 (.101)
4. By meteorological conditions, all stations (B-4)								
a. Wind Speed								
<2.5 m/sec	723	-37.4 (±18.3)	0.59	41692 (37727, 46384)	43037	127.6	-0.06 (-0.13, 0.02)	-0.19 (.072)
2.5 to 5 m/sec	1550	37.9 (±8.1)	0.76	15330 (14309, 16475)	16760	90.0	-0.02 (-0.07, 0.03)	-0.17 (.049)
>5 m/sec	388	57.0 (±13.9)	0.77	10868 (9496, 12595)	14083	87.0	-0.05 (-0.15, 0.05)	-0.10 (.098)
b. Stability Group								
Class A & B	228	-61.7 (±42.6)	0.53	63009 (52947, 76608)	66542	159.2	-0.04 (-0.17, 0.09)	-0.16 (.127)
Class C	203	-21.4 (±18.9)	0.57	32647 (27165, 40193)	33040	125.2	-0.01 (-0.14, 0.13)	-0.15 (.135)
Class D	1481	40.0 (±8.5)	0.74	17374 (16192, 18703)	18962	95.1	-0.16 (-0.21, -0.11)	-0.15 (.050)
Class E & F	449	43.3 (±7.0)	0.87	4111 (3625, 4713)	5978	56.5	-0.21 (-0.30, -0.12)	-0.22 (.091)

TABLE B. (PART I) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: RPSUM AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures - Unpaired Comparisons: Difference of Averages $\bar{C}_o - \bar{C}_p$ ($\mu g/m^3$)	Variance Comparison S_o'/S_p'	Frequency Distribution Comparison $[f(C_o) - f(C_p)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	357	45.7	33.5	12.2 ($\pm$5.4)	0.71 (0.59, 0.87)	-0.32 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1206	25.4	16.2	9.2 ($\pm$2.2)	0.88 (0.79, 0.98)	-0.45 (.055)
3. All concentrations, by station (B-1)						
Station 1	243	28.9	13.4	15.5 ($\pm$4.6)	1.71 (1.36, 2.13)	-0.50 (.123)
Station 2	239	25.7	11.2	14.5 ($\pm$4.1)	1.46 (1.17, 1.83)	-0.56 (.124)
Station 3	203	22.3	23.9	-1.6 ($\pm$6.2)	0.28 (0.22, 0.35)	-0.35 (.135)
Station 4	222	28.6	21.2	7.4 ($\pm$5.7)	1.58 (1.26, 1.98)	-0.26 (.129)
Station 5	133	14.7	15.5	-0.8 ($\pm$6.1)	0.22 (0.16, 0.29)	-0.58 (.167)
Station 6	166	27.7	12.6	15.7 ($\pm$4.9)	1.10 (0.84, 1.42)	-0.57 (.149)

TABLE B. (PART 2) COMPARISON OF OBSERVED AND PREDICTED SO_2 CONCENTRATION VALUES EVENT-BY-EVENT (PAIRED IN TIME)

CLIFTY CREEK (1976) MODEL: MPSDM AVERAGING TIME: 24 HOURS

Data Sets	Number of Events	Performance Measures - Paired Comparisons: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Bias: Fraction of Positive Residuals ($C_o > C_p$)	Characteristic Discrepancies: Noise (Variance) ($\mu g/m^3$)^2	Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient	Frequency Distribution Normality Test $[f(d) - f_n)]$ max (fraction)
1. Highest concentration, event-by-event (A-1)	357	12.3 (±5.1)	0.75	1993 (1732, 2325)	2138	34.6	0.26 (0.16, 0.36)	-0.14 (.102)
2. All concentrations, all stations (paired in time and location) (B-3)	1206	9.1 (±2.3)	0.75	1226 (1134, 1331)	1309	24.6	0.17 (0.12, 0.23)	-0.17 (.055)
3. All concentrations, by station (B-1)								
Station 1	243	15.5 (±5.0)	0.78	1150 (971, 1389)	1387	25.5	0.13 (0.00, 0.25)	0.15 (.123)
Station 2	239	14.5 (±4.3)	0.83	712 (601, 861)	919	22.3	0.32 (0.21, 0.43)	-0.17 (.124)
Station 3	203	-1.7 (±6.6)	0.65	1915 (1593, 2358)	1908	28.6	0.07 (-0.07, 0.20)	-0.18 (.135)
Station 4	222	7.4 (±5.1)	0.66	1363 (1143, 1662)	1411	25.0	0.28 (0.15, 0.40)	0.14 (.129)
Station 5	133	-0.8 (±5.5)	0.77	1105 (883, 1435)	1097	20.3	0.18 (0.01, 0.34)	-0.29 (.167)
Station 6	166	15.6 (±4.5)	0.83	817 (667, 1030)	1056	24.3	0.21 (0.06, 0.35)	-0.17 (.149)

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2)
CLIFTY CREEK (1975) AVERAGING TIME: 1 HOUR

MODEL	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Performance Measures: Bias: Fraction of Positive Residuals ($C_o > C_p$)	Performance Measures: Characteristic Discrepancies: Noise ($\mu g/m^3$)^2	Performance Measures: Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Performance Measures: Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient
MPSDM	994.5	1816.2	-821.8 (±958.4)	0.17	833745 (324920, 5016516)	1370071	876.3	-0.34 (-0.90, 0.65)

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2) CLIFTY CREEK (1975) AVERAGING TIME: 3 HOURS

MODEL	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Performance Measures: Bias: Fraction of Positive Residuals ($C_o > C_p$)	Performance Measures: Characteristic Discrepancies: Noise ($\mu g/m^3$)^2	Performance Measures: Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Performance Measures: Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient
MPSDM	543.3	826.3	-283.0 ($\pm$403.8)	0.33	148006 (57680, 890529)	203466	314.4	-0.05 (-0.83, 0.79)

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2)
CLIFTY CREEK (1975) AVERAGING TIME: 24 HOURS

MODEL	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Performance Measures: Bias: Fraction of Positive Residuals ($C_o > C_p$)	Performance Measures: Characteristic Discrepancies: Noise ($\mu g/m^3$)^2	Performance Measures: Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Performance Measures: Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient
MPSEM	151.8	200.3	-48.5 (±98.8)	0.33	8866 (3455, 53344)	9741	83.7	0.27 (-0.69, 0.89)

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2)
CLIFTY CREEK (1976) AVERAGING TIME: 1 HOUR

MODEL	Average Observed Value C_O ($\mu g/m^3$)	Average Predicted Value C_P ($\mu g/m^3$)	Performance Measures: Bias: Average Difference ($C_O - C_P$) ($\mu g/m^3$)	Performance Measures: Bias: Fraction of Positive Residuals ($C_O > C_P$)	Performance Measures: Characteristic Discrepancies: Noise ($\mu g/m^3$)^2	Performance Measures: Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)^2	Performance Measures: Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Performance Measures: Characteristic Discrepancies: Correlation Coefficient
RPSUM	858.1	1862.8	-1004.7 ($\pm$572.7)	0.00	297688 (116012, 1791142)	1257581	1004.8	0.34 (-0.65, 0.90)

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2)
CLIFTY CREEK (1976) AVERAGING TIME: 3 HOURS

			Performance Measures					
			Bias		Characteristic Discrepancies			
MODEL	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Fraction of Positive Residuals ($C_o > C_p$)	Noise ($\mu g/m^3$)^2	Gross Variability ($\mu g/m^3$)^2	Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient
MPSUM	525.6	409.4	-383.8 (±382.2)	0.17	132590 (51672, 797773)	257740	422.8	0.07 (-0.78, 0.84)

TABLE C. COMPARISON OF MAXIMUM OBSERVED AND MAXIMUM PREDICTED CONCENTRATION VALUES, PAIRED BY STATION (A -2) CLIFTY CREEK (1976) AVERAGING TIME: 24 HOURS

MODEL	Average Observed Value C_o ($\mu g/m^3$)	Average Predicted Value C_p ($\mu g/m^3$)	Performance Measures: Bias: Average Difference ($C_o - C_p$) ($\mu g/m^3$)	Performance Measures: Bias: Fraction of Positive Residuals ($C_o > C_p$)	Performance Measures: Characteristic Discrepancies: Noise ($\mu g/m^3$)'	Performance Measures: Characteristic Discrepancies: Gross Variability ($\mu g/m^3$)'	Performance Measures: Characteristic Discrepancies: Average Absolute Difference ($\mu g/m^3$)	Correlation Coefficient
MPSDM	132.8	149.3	-16.5 (±57.9)	0.50	3038 (1184, 18279)	2805	46.3	-0.27 (-0.89, 0.69)

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1975) AVERAGING TIME: 1 HOUR

	SO_2 Concentration ($\mu g/m^3$)								
MODEL	Highest Observed value over all events and all locations $C_o$max (Day, Hour)	Highest Predicted value over all events and locations $C_p$max (Day, Hour)	Difference of Maximum Values $C_o - C_p$	Difference between $C_o$max and - Predicted value for same event and location as $C_o$max	Highest Predicted Value for same event as $C_o$max (any location)	Highest Predicted Value for same location as $C_o$max (any event)	Difference between C_o and $C_p$max, where C_o is- Observed value for same event and location as $C_p$max	Highest Observed value for same event as $C_p$max (any location)	Highest Observed value for same location as as $C_i$max (any event)
MPSDM	1672.7(24,13)	2949.1(194,9)	-1276.4	1304.4	1304.4	-472.2	-2939.6	-2939.6	-2492.1

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1975) AVERAGING TIME: 3 HOURS

	SO_2 Concentration ($\mu g/m^3$)								
	Highest Observed value over all events and all locations $C_o$max	Highest Predicted value over all events and locations $C_p$max	Difference of Maximum Values	Difference between $C_o$max and - Predicted value for same event and location	Highest Predicted Value for same event as $C_o$max (any location)	Highest Predicted Value for same location as $C_o$max (any event)	Difference between C_o and $C_p$max, where C_o is- Observed value for same event and location as	Highest Observed value for same event as $C_p$max (any location)	Highest Observed value for same location as $C_L$max (any event)
MODEL	(Day,Hour Ending)	(Day,Hour Ending)	C_o-C_p	as $C_o$max			Cp^{max}		
MPSDM	794.0(24,15)	1260.8(5,12)	-466.8	513.9	513.9	-466.7	-1229.0	-1227.0	-466.8

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1975) AVERAGING TIME: 24 HOURS

	SO_2 Concentration ($\mu g/m^3$)								
MODEL	Highest Observed value over all events and all locations $C_o max$ (Day)	Highest Predicted value over all events and locations $C_p max$ (Day)	Difference of Maximum Values $C_o - C_p$	Difference between $C_o max$ and - Predicted value for same event and location as $C_o max$	Highest Predicted Value for same event as $C_o max$ (any location)	Highest Predicted Value for same location as $C_o max$ (any event)	Difference between C_o and $C_p max$, where C_o is- Observed value for same event and location as $C_p max$	Highest Observed value for same event as $C_p max$ (any location)	Highest Observed value for same location as $C_p max$ (any event)
MPSDM	209.5(24)	322.4(342)	-112.9	14.2	14.2	-112.9	-297.4	-297.4	-112.9

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1976) AVERAGING TIME: 1 HOUR

	SO_2 Concentration ($\mu g/m^3$)								
MODEL	Highest Observed value over all events and all locations $C_O max$ (Day, Hour)	Highest Predicted value over all events and locations $C_P max$ (Day, Hour)	Difference of Maximum Values $C_O - C_P$	Difference between $C_O max$ and - Predicted value for same event and location as $C_O max$	Highest Predicted Value for same event as $C_O max$ (any location)	Highest Predicted Value for same location as $C_O max$ (any event)	Difference between C_O and $C_P max$, where C_O is- Observed value for same event and location as $C_P max$	Highest Observed value for same event as $C_P max$ (any location)	Highest Observed value for same location as $C_P max$ (any event)
MPSDM	950.8(302,13)	2816.7(119,10)	-1865.9	950.8	720.0	-1865.9	-2432.9	-2432.9	-1865.9

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1976) AVERAGING TIME: 3 HOURS

	SO_2 Concentration ($\mu g/m^3$)								
	Highest Observed value over all events and all locations $C_o max$	Highest Predicted value over all events and locations $C_p max$	Difference of Maximum Values	Difference between $C_o max$ and - Predicted value for same event and location	Highest Predicted Value for same event as $C_o max$ (any location)	Highest Predicted Value for same location as $C_o max$ (any event)	Difference between C_o and $C_p max$, where C_o is- Observed value for same event and location as	Highest Observed value for same event	Highest Observed value for same location as $C_p max$ (any event)
MODEL	(Day,Hour Ending)	(Day,Hour Ending)	$C_o - C_p$	as $C_o max$			$C_p max$	as $C_p max$ (any location)	
MPSDM	623.7(362,15)	1430.2(179,12)	-806.5	618.6	610.6	-413.5	-1418.4	-1328.8	-888.2

TABLE D. COMPARISONS OF HIGHEST OBSERVED AND PREDICTED CONCENTRATION VALUES FOR DIFFERENT TIME AND SPACE PAIRINGS (A - 3)
CLIFTY CREEK (1976) AVERAGING TIME: 24 HOURS

	SO_2 Concentration ($\mu g/m^3$)								
	Highest Observed value over all events and all locations	Highest Predicted value over all events and locations	Difference of Maximum Values	Difference between $C_o$max and - Predicted value for same event and location	Highest Predicted Value for same event as $C_o$max (any location)	Highest Predicted Value for same location as $C_o$max (any event)	Difference between C_o and $C_p$max, where C_o is- Observed value for same event and location as	Highest Observed value for same event	Highest Observed value for same location as
MODEL	$C_o$max (Day)	$C_p$max (Day)	$C_o - C_p$	as $C_o$max			$C_p$max	as $C_p$max (any location)	as $C_p$max (any event)
MPSDM	181.2(330)	211.0(105)	-29.8	176.1	166.3	36.5	-174.4	-131.4	-78.2